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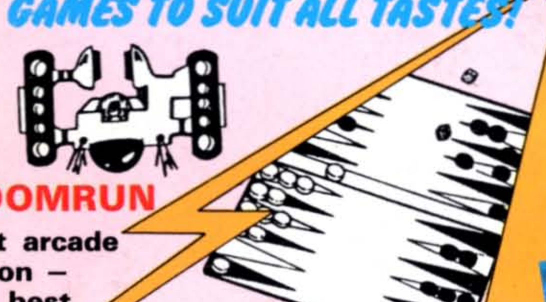

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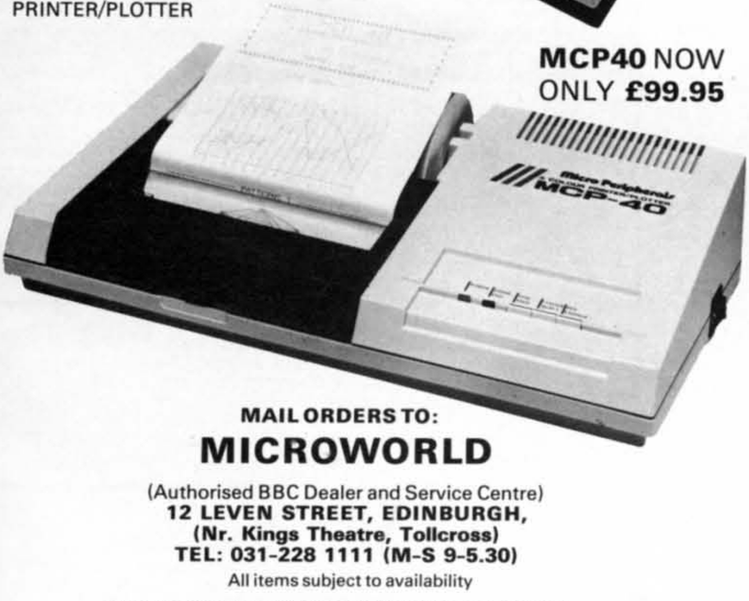

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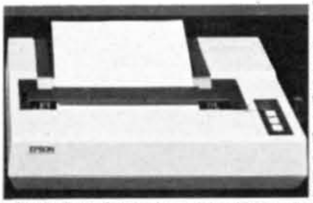

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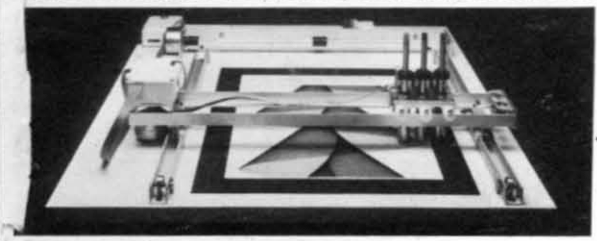

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Continued on page... 11

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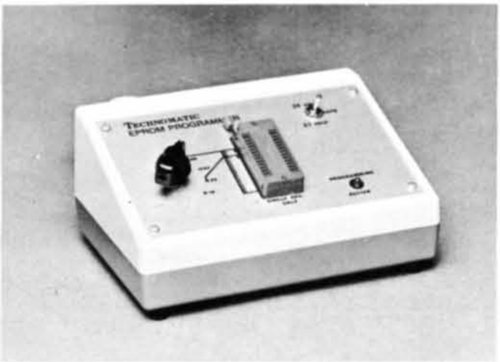

The programmer comes complete with cables, software & operating manual.
£89 + £2.50 carriage. Software on disc £2 extra.

- **Menu Driven Software provides user friendly options for programming the eprom with:**
  - **a) Basic programs.**
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including BBC printer lead
Twelve Months full warranty.
Offer valid while stocks last.

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A low cost unit that opens up the total range of Real-Time applications. With its full battery backup, possibilities include an Electronic Diary, continuous display of 'on-screen' time and date information automatic document dating, precise timing & control in scientific applications, recreational use in games etc—its uses are endless and are simply limited by one's imagination. Simply plugs into the user port—no specialist installation required—No ROMS. Supplied with extensive applications software.
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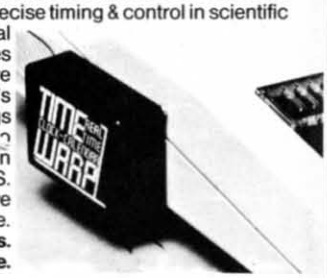

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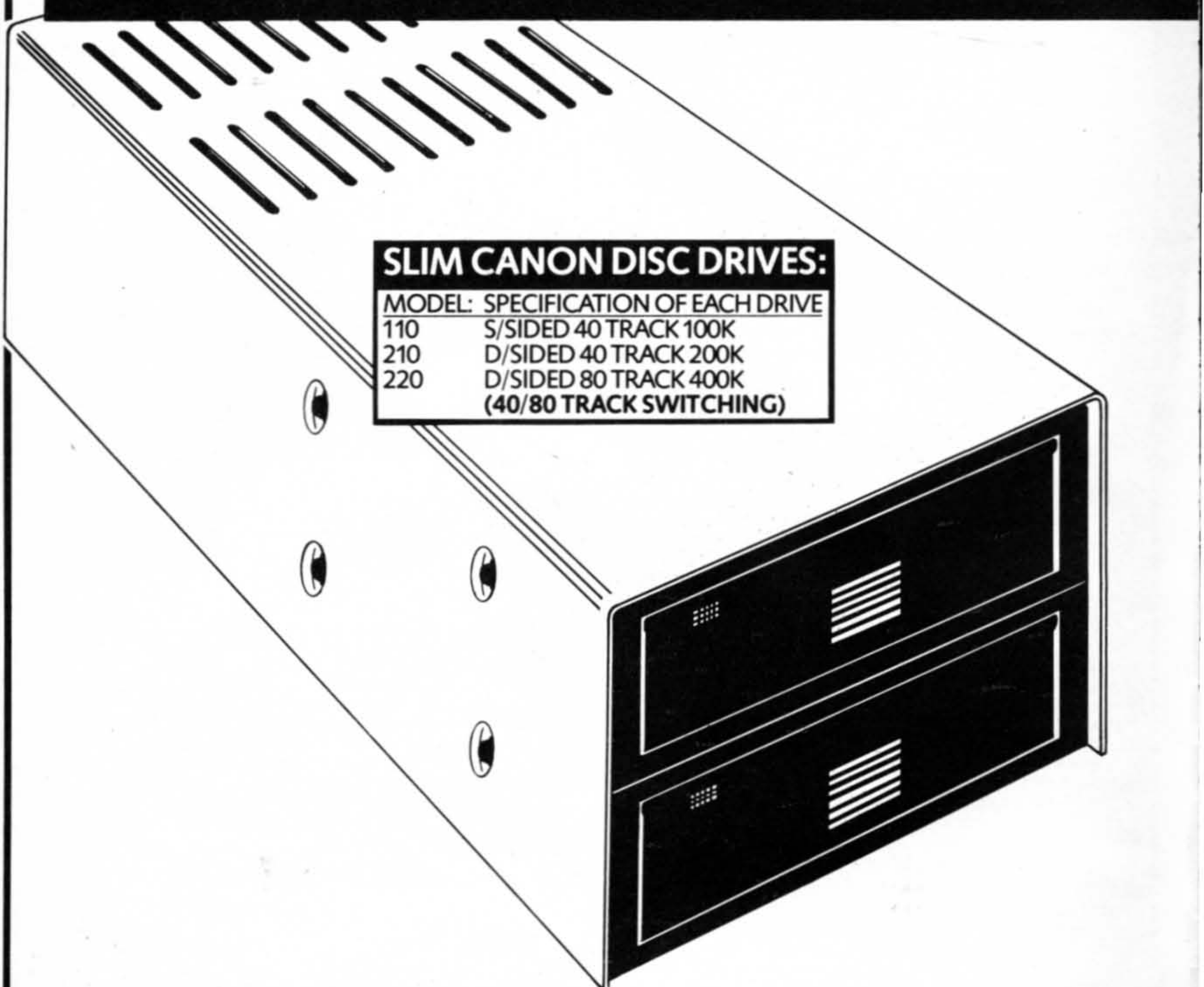

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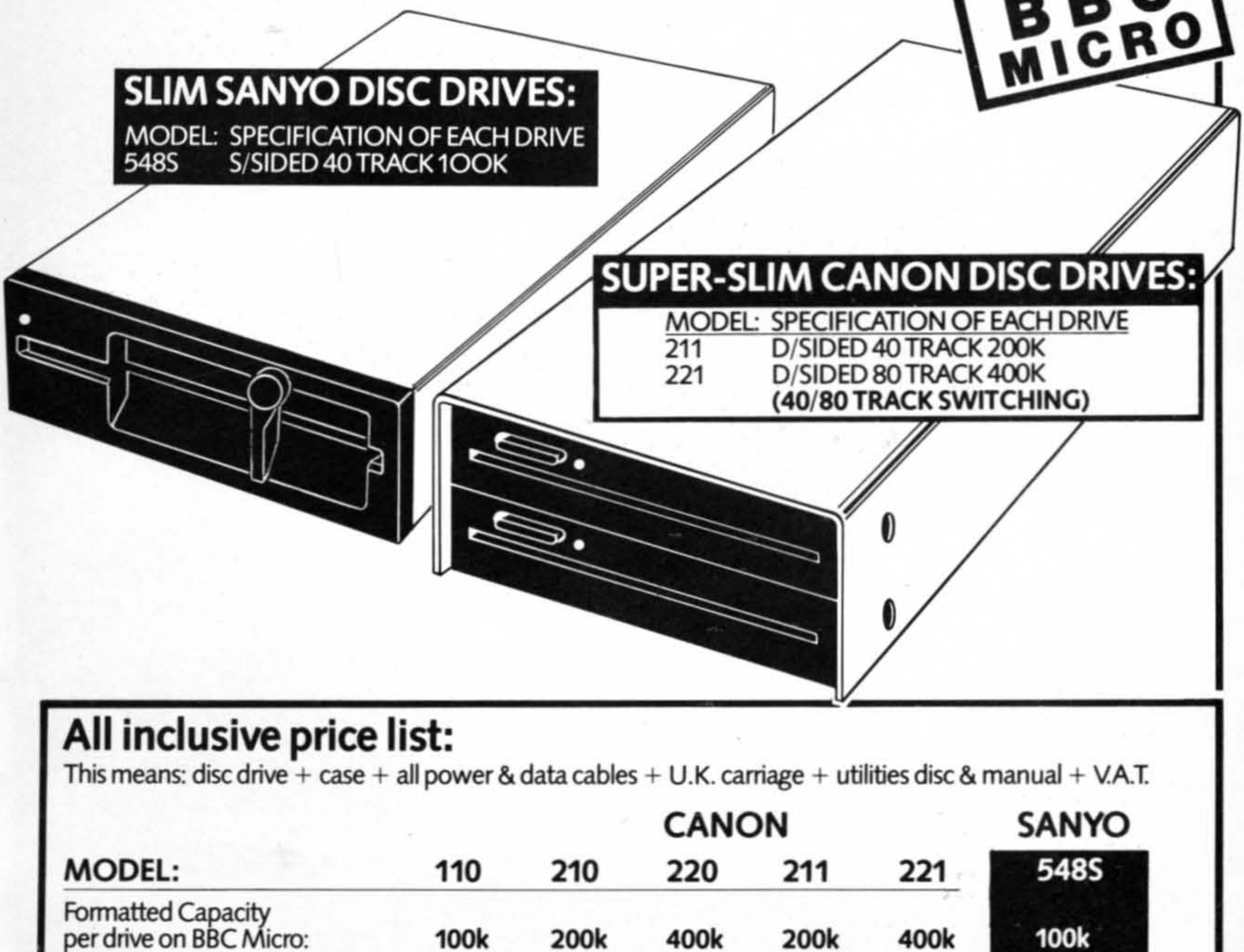
FOR THE BBC MICRO



SLIM SANYO DISC DRIVES:

MODEL:	SPECIFICATION OF EACH DRIVE
548S	S/SIDED 40 TRACK 100K

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MODEL:	SPECIFICATION OF EACH DRIVE
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MODEL:	**110**	**210**	**220**	**211**	**221**	**548S**
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for the BBC Micro

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BASIC Utility ROM

CARETAKER is a BASIC utility ROM which provides many new invaluable commands to help the BASIC programmer. Because CARETAKER is in ROM, it uses no BASIC program space and its commands are always instantly available. Some of the CARETAKER commands are detailed below:

★EXCHANGE - provides a search and replace facility, either global or selective. 'Wildcard' characters and BASIC keyword tokens may be included.

★EXPAND - Lists a program in an easy-to-read form, also allowing 'squashed' programs to be read.

★INSERT - Enables BASIC routines on disc or tape to be inserted into or added to the program in memory.

★KEYLOAD and **★KEYSAVE** - Load and save the function key definitions.

★LVAR - Lists the values of all or some of the variables.

★MERGE - Will merge one or more BASIC programs on file into the program in memory.

★MOVE - Allows the current BASIC program to be moved to a new page in memory.

★PARTSAVE - Saves only a selected section of a BASIC program (useful for later merging).

★RENUMBER - Renumbers parts of BASIC programs and moves the renumbered section as necessary.

★RETRIEVE - Restores a corrupted program to a form in which it can be listed and edited.

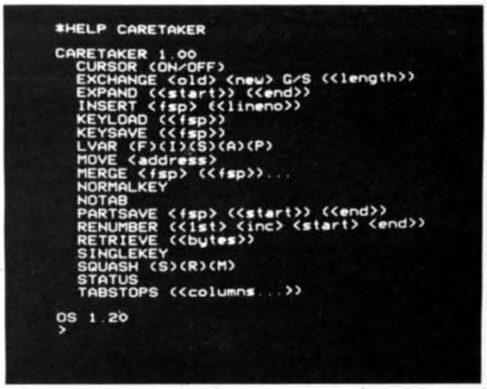
★SINGLEKEY - Enables BASIC keywords to be entered quickly, as on the ELECTRON.

★SQUASH - Reduces the size of a BASIC program in order to save memory space. A very efficient routine.

★STATUS - Displays the values of PAGE, HIMEM, program length, bytes free, etc.

★TABSTOPS - Provides a tabulation facility. Up to eight tapstops can be defined.

CARETAKER is supplied with a spiral bound manual, special 'single-key entry' stickers for the key fronts, and easy-to-follow fitting instructions. A full specification is available upon request.



```
*HELP CARETAKER

CARETAKER 1.00
   CURSOR (ON/OFF)
   EXCHANGE <old> <new> G/S <<length>>
   EXPAND <<start>> <<end>>
   INSERT <fsp> <<lineno>>
   KEYLOAD <<fsp>>
   KEYSAVE <<fsp>>
   LVAR (F)(I)(S)(A)(P)
   MOVE <address>
   MERGE <fsp> <<fsp>>...
   NORMALKEY
   NOTAB
   PARTSAVE <fsp> <<start>> <<end>>
   RENUMBER <<1st> <inc> <start> <end>>
   RETRIEVE <<bytes>>
   SINGLEKEY
   SQUASH (S)(R)(M)
   STATUS
   TABSTOPS <<columns...>>

OS 1.20
>
```

New Release

£33.35 incl.

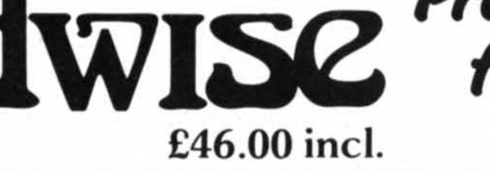
Wordwise

The Most Popular Word Processing ROM for the BBC Micro

£46.00 incl.

WORDWISE is ideal as an introduction to word processing for the beginner, but is a powerful enough tool to be used seriously by professional authors (at least two of the most popular BBC Micro magazines are prepared entirely with WORDWISE). Being entirely ROM based it occupies none of the memory which is used to store text. It will operate fully on cassette, disc or ECONET (level II). It is not specific to any particular printer, nor does it require a special printer-driver (an expensive extra on some word processors). WORDWISE allows any codes to be sent to any printer, at any point within the text, by using a simple 'embedded command'.

For the beginner, text can be typed straight into WORDWISE and saved, loaded, previewed or printed immediately. Once experience is gained, commands may be added to control the final layout on paper. Some of the layout or 'formatting' commands are described later. At any time whilst the text is being entered or edited a word count is displayed continuously on the top line. Labelled function keys provide the user with simple controls to mark any section of text and then delete, move or copy it to any other position. Characters can be quickly converted between upper and lower case; changing case of entire paragraphs is equally simple.



```
        WORDWISE
 (C) Computer Concepts 1982

 1)  Save entire text
 2)  Load new text
 3)  Save marked text
 4)  Load text to cursor
 5)  Search and Replace
 6)  Print text
 7)  Preview text
 8)  Spool text

 ESC Edit Mode

Please enter choice_
```

Moving around the text is simple. Cursor keys alone move one position in any direction; CTRL and cursor keys together move in larger steps, a word left/right, a page up/down; SHIFT and cursor keys move as far as possible to the right/left of the line or to the start/end of the entire text. These movements are so easy to use that many other programs have adopted exactly the same method.

Formatting commands include the ability to split the document into pages of any length, with or without headings or footings. Page numbers may be printed automatically within the text, including within headings and footings. Commands are provided to set (at any point in the text) line length, left margin, tabulation positions, line spacing etc. Text can be centred on a line, indents and temporary indents can be set and cancelled. Output can be made to automatically pause at the end of a page, e.g. for a single-sheet feed. Right justification of text can be turned on and off at any points in the text.

User-defined keys may hold any required string as normal and used within WORDWISE, including the codes required to induce key-operations such as cursor movement.

ARIES compatible WORDWISE

A new version of WORDWISE is available upon request at the standard price which is fully compatible with the ARIES B20 RAM board. When fitted alongside the compatible WORDWISE, the ARIES board allows text to be previewed in 80-columns even with the normal RAM full of text. An upgrade from the standard version of WORDWISE is available. Please ask for details.

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The first IBM P.C.
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For an amazing mail order price of £599 (ex. VAT) the Graduate will upgrade the BBC Model B to a powerful 16-bit business computer

Fully disk and hardware compatible with the IBM P.C., the Graduate's MS™-DOS operating system allows exploration of the massive range of IBM compatible business software, programming aids, compilers and languages universally available from all major software houses.

With a simple command stroke, the system can revert to Acorn's own operating system, thereby allowing programmes in BBC Basic to be stored on disk, using the Graduate's own disk controller.

Introduction to MS™-DOS

The Graduate offers two levels of upgrade, the G400 and the G800, both with 128K user memory as standard. This can be expanded up to 256K on board, or to 1.2 Mbytes with an IBM compatible expansion board. The G400, which is available only through mail order, contains a single, double sided 400K BASF disk drive and provides the perfect introduction to MS™-DOS for the user who wants real power from his Model B.

TECHNICAL SPECIFICATION

- 8088 16-bit processor running at 5 Mhz
- 128K RAM (Expandable to 256K)
- MS™-DOS operating system customised to IBM compatibility
- Model G400 – Single, double sided, high density BASF disk drives (400K unformatted)
- Model G800 – Twin, double sided, high density BASF disk drives (800K unformatted)
- Integral stabilised power supply
- 2 IBM P.C. compatible hardware expansion buses
- Colour Software provided (not G400)
  Perfect 2 Writer/Speller (Word Processing)
  Perfect 2 Calc (Spread-Sheet)
  Perfect 2 Filer (Database)
- Disc interface is not required
  Keyboard text and graphics supplied by BBC Model B

Strong combination of Hardware and Software

A step up from the G400 is the G800 which offers twin, double sided 400K disk drives for extra data storage, together with the Perfect 2 Software suite of business programmes (colour version) comprising Word Processing, Spread-Sheet and Database. This strong combination of hardware and software upgrades your BBC Model B to a versatile business management aid, with the option of even further upgrading for networking, modems, etc., via the IBM compatible hardware slots provided by the Graduate models. Both models come complete with a well written user/technical manual, connecting leads and a mail order catalogue featuring ancilliaries and peripherals.

Just plug it in

The compact and tidy Graduate models simply plug in to the 1MgHz bus on the Model B. Within minutes you can be up and running with a fully IBM compatible system that really means business.

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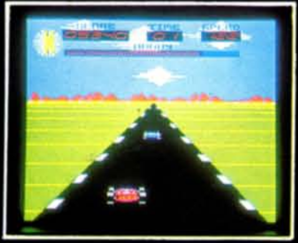

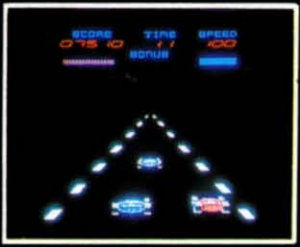

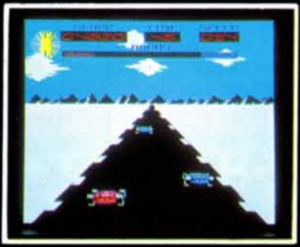

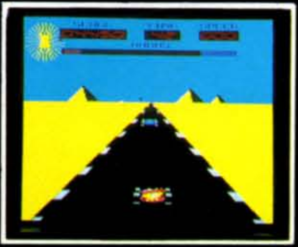

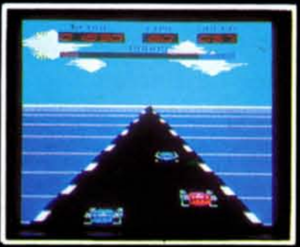

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A highly-addictive multi-stage 3D race game. You steer your car left and right, accelerate and decelerate as the opposing cars weave about the road. There are five different stages including night, snow, desert, and riverside scenes. To qualify for the next stage, you must finish in the top twelve. Incredible graphics give the impression that you really are taking part in the race. Highly recommended, and destined to become another top-seller for Superior Software.

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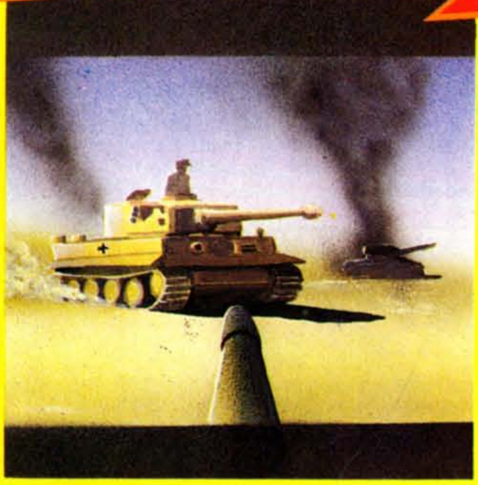

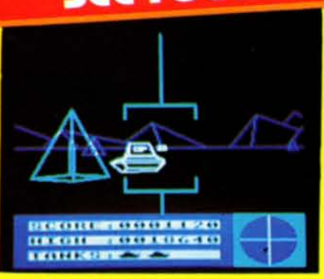

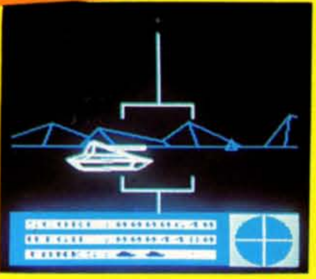

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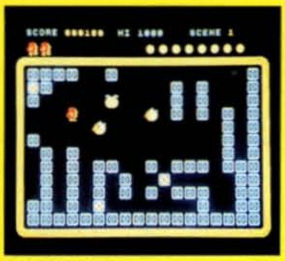

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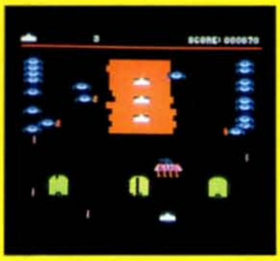

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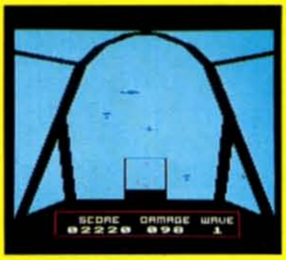

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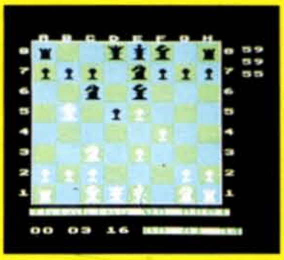

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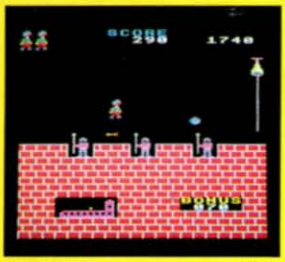

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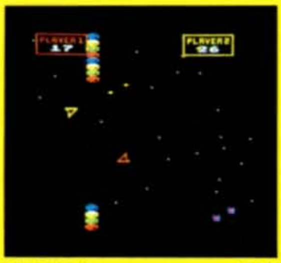

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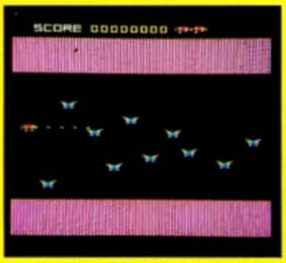

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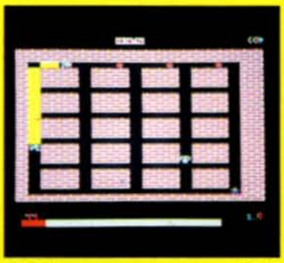

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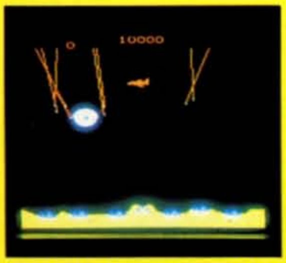

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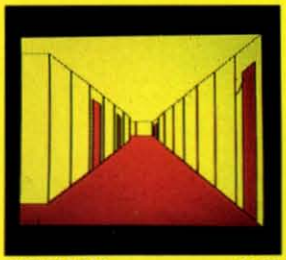

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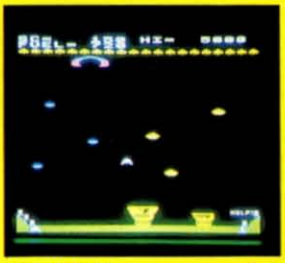

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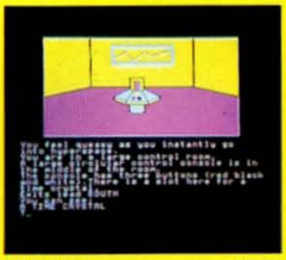

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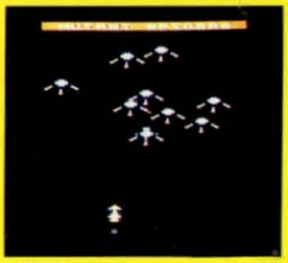

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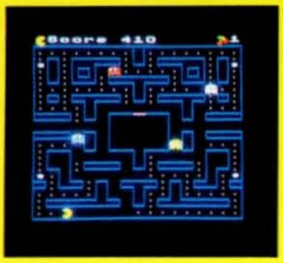

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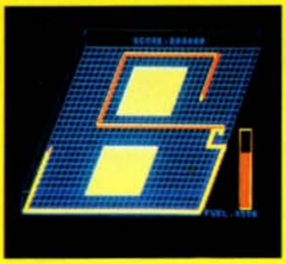

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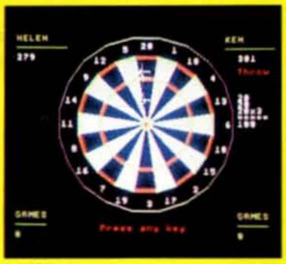

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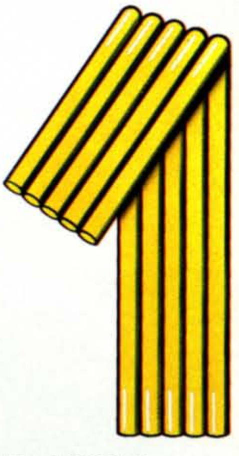

The ZEP 100
- ●**Z80 Extension Processor**
- ●**4MHz Z80A**
- ●**64K RAM**
- ●**24K ROM**

The object of any upgrade kit is to improve processing ability and to increase data storage capacity. The UNICORN ZEP100 is the first stage upgrade which opens channels into the world of serious computing.

The ZEP100 is the proven 8 bit second processor for the BBC Model B micro. A Z80 extension processor which enables the use of the well established CPN operating system, giving access to the vast range of applications programs and languages available for all CP/M® micros. When fitted to a BBC model B microcomputer with compatible high quality disc drives it provides a complete business or scientific computer which can run large applications programs or use advanced languages, with the ability to switch back to standard BBC programs at any time.

Any ZEP100 can be linked, via the Econet® option on the BBC, to a network of other TORCH computers to provide a workstation running on TORCHNET. Full TORCHNET operating systems software is provided to allow access to information anywhere on the network, or to communicate with other computers.

The 64K ZEP100 is supplied with full software support including word processing, spreadsheet, database and utilities. **The ZEP100 – around £299 (ex. VAT).**

The new UNICORN range from TORCH Computers gives the enthusiast and professional user a choice of upgrades which takes the BBC Model B Micro to the ultimate height of performance.

The result of TORCH'S total commitment to the BBC Micro is the only complete range of high performance hardware available. Offering every BBC Micro owner five new upgrade channels, UNICORN will transform your BBC into a fully communicating workstation, a CP/M® compatible business machine or the ultimate in high powered 32-bit data processing.

At the top of the range, THE UNICORN, offers the power and sophistication of System III UNIX® whilst other channels make available the flexibility of languages such as FORTRAN, PASCAL, BCPL and COBOL. All models, with the exception of the HDP240, provide BBCBASIC(Z80) on the Z80 rather than the Model B's 6502.

Tune in to the Channel that most suits your requirements. Whichever level you choose you can be sure of a system with infinitely expandable potential for a confident future in the world of computing.

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The ZDP 240

- ●4MHz Z80A ●64K RAM
- ●24K ROM
- ●Twin, double sided 400K floppy discs
- ●Independent integral power supply

TORCH Z80 DISC PACK

The UNICORN ZDP240 (Torch Z80 Disc Pack) is the proven upgrade for the BBC Model B microcomputer. Offering the use of more powerful and flexible languages such as Fortran, Pascal, BCPL and Cobol, it provides 800K of disc storage plus a Z80 second processor with 64K RAM running TORCH's own CP/M® compatible operating system based in ROM.

This advanced design means that almost all of the 64K RAM provided by the Z80 board is available for CP/M® programming use – an advantage no other BBC micro upgrade can offer.

If your BBC micro has the Econet® option, there is a further benefit the ZDP240 can offer. TORCHNET can link together up to 254 upgraded Model B's on a local area network, so for enthusiasts, Clubs and Schools it is a simple and low-cost way to achieve networking facilities.

The discs can be used for storage under the Acorn DFS system or for CP/M® programs and data.

A comprehensive software package is provided with the disc pack. It includes word and data processing and a spreadsheet program, along with utility programs and manuals.

The TORCH Z80 Disc pack is recommended by the CCTA for government use. **The ZDP 240 – around £699 (ex. VAT).**

The HDP 240

- ●20Mbyte hard disc Winchester
- ●Double sided 400K floppy disc
- ●Integral power supply

For users who need much more storage capacity than is available on floppy discs and who require the large speed gains that a Winchester hard disc provides, the third new channel is now available.

The UNICORN HDP240 combines a 400K floppy disc drive with a 20Mb hard disc and its associated controller. The pack connects directly to the disc and 1MHz bus sockets on the BBC Model B.

In conjunction with a ZEP100, it provides a powerful business computer for running CP/M® programs with large amounts of data. The floppy disc can be used for storage with the Acorn DFS system, and both discs can be used by other TORCH systems on the TORCHNET local area network. **The HDP240 – around £1995 (ex. VAT).**

TORCH
UNICORN

The HDP68K

- ●8MHz MC68000 ●6MHz Z80B
- ●256K RAM (68000)
- ●64K RAM (Z80)
- ●20 Mbyte hard disc Winchester
- ●Double sided 400K floppy disc
- ●Integral power supply

The fourth channel in the UNICORN range is for users who need the extra processing power of a 68000 32 bit processor, as well as the Z80 running standard software. The UNICORN HDP68K provides the ultimate in performance, offering an extra 256K RAM and a 68000 processor running at 8 million cycles per second. It also contains a Z80 processor to allow the running of existing TORCH software.

The HDP68K – around £2495 (ex. VAT).

The Unicorn

Spec. as HDP68K PLUS UNIX® operating system.

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BBC 7

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QUEEN SEES WHAT BEEB IS MADE OF

THE Queen was treated to a glimpse inside the BBC Micro when she officially opened the Cambridge Information Technology Centre.

Student Stewart Janes was busy changing the disc interface when the Queen dropped by on her tour of the facility – the 100th ITEC to be opened in Britain.

And the Duke of Edinburgh, who accompanied the Queen, was moved to ask Stewart: "Do you think Acorn will mind?"

Cambridge ITEC is sponsored by Cambridge City Council in partnership with the Manpower Services Commission and the Department of Trade and Industry.

Its purpose is to provide 12 months' training and work experience for school leavers in areas of new information technology as part of the Youth Training Scheme.

The BBC Micro is playing a leading role in the facility. There are some 15 Acorn machines in the building, with the computer classroom devoted entirely to the BBC Micro.

Acorn boss Chris Curry is a member of the governing board of Cambridge ITEC.

CONTEST TO CUT ROAD DEATHS

A CALL has gone out to the ever increasing army of computer whizz kids to come up with an electronic answer to help keep death off the roads.

They are being invited to take part in a major contest to write the best computer program for the BBC Micro or the Electron on the theme of road safety.

Open to all schoolchildren in the Greater London area, the new contest is being sponsored by the publishers of *The Micro User* and *Electron User* magazines.

Posters and copies of the rules have already been sent out to more than 2,000 primary and secondary schools, with disc drives being offered as prizes.

Final judging and presentation of the awards will take place at the Electron & BBC Micro User Show which is held at Alexandra Palace from July 19 to 22.

The Royal Society for the Prevention of Accidents and the Metropolitan Police are backing the contest.

"We feel that road safety schemes in the past have tended to talk down to children", says Mike Cowley, a spokesman for Database Publications, organisers of the contest.

"Here then is an opportunity for children themselves to show what they can do by using their knowledge of the new technology to make a real impact on the road safety front".

Chips shortage starts a black market

A CRITICAL shortage of chips facing add-on manufacturers for the BBC Micro and the Electron has resulted in the creation of a black market.

Within the last few weeks some peripheral companies have been forced to pay more than 200 per cent above normal market price by unscrupulous wheeler-dealers quick to cash in on the situation.

For although Acorn is guaranteed a constant flow of the vital 8271 chips – the nerve centre of the BBC Micro's disc system – smaller firms manufacturing add-ons have been unable to obtain supplies for more than two months.

And without these, independent companies would no longer be able to supply users with competitively priced disc drives and disc interfaces – the most widely sought after extras for the machines.

An investigation by *The Micro User* has revealed that the companies forced into paying extortionate prices are afraid to comment in case even those sources dry up.

"We are in a very difficult situation", one director admitted. "Here we are wanting to meet market demand but can't get the chips other than by having to pay these cut-throat prices.

"A number of people are making a lot of money out of us because we have nowhere else to turn".

However not all manufacturers are willing to pay through the nose. Some have refused to deal on the black market.

"You won't be seeing any peripherals for the BBC from us until we can get hold of the chips at the normal price", one purchasing manager told *The Micro User*.

"I don't see why these sharks should get rich out of our problems".

When news of the situation was broken to Intel Corporation – the manufacturer and worldwide supplier of the 8271 – a company spokesman expressed astonishment.

"One thing is certain, and that is that we are not supplying the black market", he said.

"Every one of our customers for this chip is known to us by name".

Asked how a black market could spring up if Intel effectively controls the supply of the 8271 chip, the spokesman said: "I suppose if people are prepared to pay very high prices, you'll always find somebody somewhere who can get hold of them – no matter how devious the means".

Second Processor opens up business market

ACORN has launched the BBC Micro into the business market with a £299 expansion unit.

The Z80 Second Processor upgrades the company's best selling machine to a full CP/M based business computer, complete with free business software.

Acorn's marketing manager, Tom Hohenberg, said: "The Z80 expanded BBC Micro is a low cost yet powerful system. Its full CP/M compatibility opens up a huge range of some 6,000 ready made applications for the business user.

"And through our unique dual processor design, it offers a speed and performance better than either competitive expansions or most conventional business systems".

As well as the CP/M2.2 operating system, there is a comprehensive suite of applications programs and development software.

The programs are intended to provide a complete start-up system for business and professional home users, whether programmers or not.

Software

The free software includes three office productivity aids – word processing, database and spreadsheet (with integrated graphics), an integrated accounting system, the award-winning Nucleus applications generator, and the languages CIS Cobol, Professional Basic and a Z80 version of BBC Basic.

Acorn has asked Software Ltd to configure its range of CP/M packages for the Z80 add-on.

The software catalogue offers more than 300 packages, including Wordstar, Dbase 11, DMS Delta and Supercalc 11.

Software Ltd was given a pre-release version of the new add-on and staff worked with Acorn for several months to ensure compatibility and availability of software from day one.

A lesson for the Minister

TRADE and Industry Under-Secretary John Butcher taking a lesson on the BBC Micro from a pupil of Barclay Junior School, Leyton. The event took place at a ceremony to hand over the Department of Trade and Industry's 20,000th computer package – more than 80 per cent of which have introduced the BBC Micro – to a primary school.

BT IS LOOKING FOR SOFTWARE AUTHORS

BRITISH Telecom is going into the software publishing business. And they are looking out for authors to write new software for popular home computers, including the BBC Micro.

The man behind the scheme is BT's manager of new information services, Dr Ed Williams. He is a psychology graduate who previously worked for six years on Prestel.

Among other things, Williams is responsible for Gamestar. This is the BT cable games network whose subscribers pay a monthly rental for a micro with access to a mixture of games and educational programs.

With five new programs being offered to subscribers each month, Gamestar will clearly need a continuous flow of new software.

And Prestel's revamped micro network will be another important outlet for BT software. It, too, will lay initial emphasis on games and educational programs.

The third prong of BT's attack on the market will be a software catalogue, which Williams hopes to bring out in time for the Christmas buying spree.

"We are prepared to take a fairly substantial loss this year, as long as we can see some progress", he told *The Micro User.*

The BBC Micro looms large in BT's software plans, too.

Says Williams: "Research shows that BBC owners buy more software packages than other micro users – and at a higher average price".

He would not comment on precisely what packages would be available from BT.

But he admitted: "It will take a long-term effort to compete with products like Wordstar and Lotus".

BT's detailed plans will depend partly on what their recruiting drive turns up in the way of authors and their packages.

Rather than commissioning people to write on specific topics, Williams is working in the other direction.

If he is approached with something that looks like a winner, then BT will take it up.

It has enhanced 6502

AN Acorn spokesman has revealed that the Second Processor is fitted with an enhanced version of the 6502.

The chip used is the GTE 65SC02, which has an extended instruction set.

It has long been known that the 6502 has "additional" instructions to the official set, and certain software houses have used these to enhance their software protection.

However the extra instructions were by-products of the way the original set were implemented and, as they could vary from manufacturer to manufacturer, could not be relied on.

The 65SC02 has the extra instructions designed into it, and Acorn has bought sufficient stocks to ensure continuity in their Second Processors.

So firm is this that Acornsoft's 6502 development system is to make use of the new set.

Acornsoft say they also reserve the right to use it in other Second Processor software.

Acorn writ forces book's withdrawal

ONE of the books of most interest to users of the BBC Micro – The BBC Micro Compendium – has been withdrawn from shops owing to pressure from Acorn.

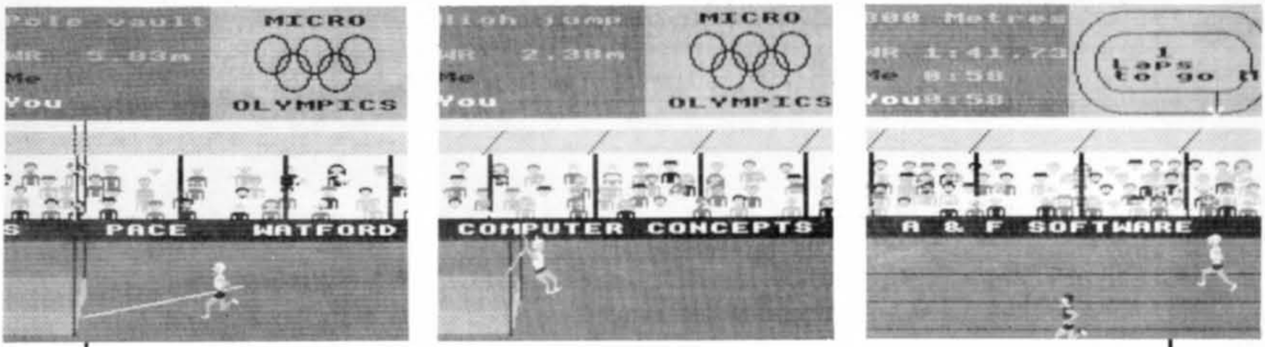
Problem is the book features a fully annotated disassembly of Basic II.

Acorn claims that this infringes copyright and took out a writ against the publishers, Interface.

For their part, Interface and the author, Jeremy Rushton, state that they were under the impression that Acorn were aware of, and approved of, their intentions.

"The writ came out of the blue", said a spokesman.

To the great disappointment of many enthusiasts, Interface has voluntarily agreed to withdraw the book until a settlement can be reached.



WE couldn't resist showing you some of the superb graphic action from our Micro Olympics. This terrific suite of programs has already become a best seller – and it's even set a record of its own. It's the first time that advertising space has been sold within a computer program.

Several *Micro User* advertisers were so impressed when they saw the program being developed they asked if they could buy space on the hoardings at the trackside!

So as you race around the track you'll be passing signs for A&F, Pace, Computer Concepts and Watford Electronics. For details of how to get YOUR copy of Micro Olympics see Page 147.

WHAT is claimed to be Britain's first truly double sided 3in disc drive has been launched by Opus Supplies. The Super 3 Microdrive comes in single and dual format complete with leads, user manual, free cartridge and a 12 month guarantee.

Opus maintains it is compatible with older 5in drives and can be daisychained to provide up to four drives for a user system.

Adventure 'cribs'

IF your Level 9 adventures regularly come to a soul-destroying halt then weep no more – help is at hand.

As a result of an experiment last year with Colossal Adventure – and in response to numerous requests – Level 9 has introduced clue sheets for all the company's adventure games.

The sheets, which contain alphabetical lists of the objects, creatures and trickiest locations, are available free on receipt of a SAE.

SHOW ALL SET TO SMASH RECORDS

THE Electron and BBC Micro User Show to be held at Alexandra Palace, London from July 19-22 is set to break all previous records.

Exhibitors have been clamouring to book space in recent weeks and the final number of standholders is expected to pass the 140 mark – some 20 more than the previous best.

Demand for advance tickets has also been heavy, running way ahead of previous preshow sales figures.

"It looks as though we are going to have a bonanza", says Mike Cowley, spokesman for Database Publications, the show organisers.

"This is particularly pleasing – some people reckoned we had bitten off more than we could chew with such an enormous venue as the Alexandra Palace Pavilion", he said.

Even before its opening on December 3, 1981, the building was being described by the architectural press as "a palace of light".

With an area of 4,600 square metres, a translucent roof 15 metres high spanning 36 metres, it is the largest fabric covered building in Britain.

Due to this innovative design, it provides 3,620 square metres of clear floor space free from columns or other obstacles.

Set in 200 acres of parkland overlooking London, the Palace has ample parking facilities.

Travel

For those who want to leave their cars at home, the Palace can be reached easily by train.

Average journey time from Piccadilly Circus is 30 minutes.

On the underground, the Victoria Line provides fast access to and from the West End and British Rail mainline stations – King's Cross, St. Pancras, Euston and Victoria.

Visitors travelling on the Victoria Line should change at Highbury and Islington for the BR suburban service.

Alexandra Palace can be reached by the Piccadilly Line from Heathrow Airport, West End and King's Cross mainline station.

The line serves Finsbury Park and Wood Green underground stations, which are also linked to the Palace by the London Transport W3 bus service. These run every seven to 10 minutes, seven days a week and extra buses will be provided during the Show.

The nearest station to Alexandra Palace is the British Rail Alexandra Palace which is on the main and suburban line from King's Cross and Moorgate.

MEMORY BOARD HITS SNAG

FOLLOWING Personal Computer World's costly wrangle with Acorn, the latest magazine to run into legal problems with manufacturers is Electronics and Computing.

Cause of the problem is their latest project Memex, a 20k expansion memory board for the BBC Micro.

The system works by switching between two separate banks of RAM, allocating graphics calls to one and ordinary memory access to the other.

Unfortunately this is how the Aries B20 board works. Electronics and Computing received a letter informing them so in no uncertain tones from the man behind the Aries, Peter Headland.

The design, said Headland, was subject to a patent application.

Commented E&C editor Gary Evans: "The implication is that our authors ripped it off, which is something we would contest. But it's put us in a difficult situation".

Further complications have arisen because the article is the first of a two part series. The next instalment is due to publish the software required to drive Memex, which might inflame the situation further.

In the meantime Peter Headland has suggested that his firm, Cambridge Computer Consultants, supply the software on ROM for a reasonable price.

He said: "We are not particularly worried about a private individual building it himself and saving a few pennies, but we don't want our research and development broadcast freely to competitors".

Now there's a selection of hardware to match our selection of software.

At HMV we've just installed the latest ranges of hardware and peripherals alongside the massive selections of software in our Computer department. So whatever you need, whether it's a disk drive or a Hobbit, or simply some expert advice, you'll know exactly where to find us.

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CS200 single 80T s/s 200K with PSU	240.00
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CD400 dual 80T s/s 400K with PSU	445.00
CD800 dual 80T d/s 800K with PSU	495.00
CD400/S dual 40/80 s/s with PSU	539.00
CD800/S dual 40/80 d/s with PSU	535.00
CSX100 single 40T s/s 100K without PSU	155.00
CSX200 single 80T s/s 200K without PSU	221.00
CSX400 single 80T d/s 400K without PSU	247.00
DFS kit (including fitting)	99.00
Torch Z80/cpm disk pack (including free software)	830.00
Acorn 6502 second processor	199.00
Acorn Z80 second processor	299.00
Sir sideways ROM board (MkII)	45.00
Solidisk 32K sideways RAM	64.95
Solidisk 128K extension for 32K board	87.95
Basic II upgrade	19.95
Microvitec 14" standard res colour monitor (TTL)	229.00
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Microvitec 14" standard res colour monitor (TTL/Comp/Audio)	255.00
Zenith 12" green monochrome monitor	95.00
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Acorn AP100 printer	199.00
Memotech DMX80 printer (Dot Matrix F/T)	295.00
Epson FX/80 printer	410.00
Sanple Daisy Step 2000 (Qume compatible Daisy Wheel)	350.00
Voltmace analogue joystick/handset	14.95
Voltmace programmable joystick adaptor	13.95
Protek BBC/Atari joystick interface	11.95
Datagem (Gemini database) (ROM)	129.00
Ade (ROM)	60.00
Spy 2 (ROM)	30.00
Pascal (HCCS) (ROM)	67.00
DFS Upgrade (Alligata) (ROM)	29.95
Caretaker (ROM)	33.95
Gemini business software (Disk or Cassette)	from 19.95
Acorn business software (Disk)	each 24.95
Aviator (Cassette)	14.95
Aviator (Disk)	18.95
JCB Digger (Cassette)	9.95
JCB Digger (Disk)	11.90
White Knight MkII (Cassette)	11.50
Ghouls (Cassette), Jet Power Jack (Cassette)	each 7.95

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Overdrive (Cassette), Battle Tank (Cassette)	each 7.95
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Large range of Disk based software.	
Complete range of Computer Concepts ROMS.	
Complete range of BBC Soft titles.	
Complete range of Program Power, Acorn, Lothlorian and Adventure International.	
Large range of Educational Software.	
Acorn Electron	199.00
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Snooker (Visions)	8.95
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Scott Adams Adventures 1-4	9.95
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Alien Dropout, Bandits at Three O'Clock, Blagger	each 7.95
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Large range of Program Power and Acorn software.

Also: Memotech, Commodore, Sinclair, Hardware and Software, and a large range of books on various subjects.

Ring 01-629 1240 to check for availability. All prices include VAT. Prices may change without notification.

the HMV shop

The Computer Dept., 1st Floor, 363 Oxford Street. (Next to Bond St. Tube)

ALL OFFERS SUBJECT TO AVAILABILITY

Radio 'hams' now tuning to TV

SSTV pictures from the monitor showing transmissions from German stations (left and right), and John Melvin's call sign (centre). CQ is a general call asking anyone to answer

FAR from being lone enthusiasts fiddling with the modern equivalent of cat's whiskers, today's radio hams are becoming deeply involved in television.

This interest has led to two radio amateurs producing a board which, with the help of their own BBC Micros, allows hams to receive pictures.

The system is called Slow Scan Television (SSTV). With it the screen has only 128 lines, and a complete picture takes seven seconds to build up.

Despite the restriction – imposed by bandwidth limitations – slow scan transmissions are proving very popular.

Costs

Previously reception required extremely expensive equipment. The new SSTV board has cut costs considerably.

The bare board, with full constructional details, costs £17.50 while an assembled, fully boxed unit costs £93. Both come with the necessary software.

The only other equipment needed is a standard shortwave radio and, of course, a BBC Micro.

Further details can be obtained by sending an SAE to John Melvin (G3LIV), 2 Salters Court, Gosforth, Newcastle, Tyne & Wear.

Acorn cause ripples with Torch takeover

ACORN has caused a few raised eyebrows in the micro industry by buying out Torch.

For although Acorn directors Herman Hauser and Chris Curry were originally Torch board members, they left early in the company's history as it was felt the two firms were producing rival products.

This is even more relevant today as Acorn's yet-to-be-unveiled Advanced Business Machine and its newly-launched Z80 Second Processor are seen to be in direct competition with Torch's computers.

However the two companies do share common ground in that Torch products use the BBC Micro as an input/output processor.

Commenting on the acquisition, Acorn director Alex Reid said: "Torch's established position in business systems is a natural outlet for some of Acorn's own business systems products.

"A rationalisation of the two companies' development efforts will give a substantial boost to both Acorn's and Torch's market prospects".

Speaking for Torch, Bob Gilkes said: "The two companies have an exceptionally high degree of compatibility".

However Acorn spokesmen were reluctant to be more specific on the actual form the rationalisation was going to take.

Among sources close to Acorn, the view is that Torch would be used to distribute Acorn's business products such as the Advanced Business Machine.

NEW CRAZE HITS MICRO WORLD

A NEW collecting craze has been launched as a spin off from the world of computers – inlay cards from micro games cassettes.

No longer content with hoarding stamps, coins, old beer bottles and the like, the computer kids are snapping up the brightly coloured cards at every opportunity.

In fact an 18 year old Fulham based collector is currently offering up to 30p each per card.

Satvinder Alg, who emigrated from India to the UK with his family in 1972, has already amassed a collection of more than 70 inlay cards.

A former stamp and coin collector, this BBC Micro owner has turned his back on such more mundane activities in favour of the new craze.

Why inlay cards? "I am fascinated with them because of the illustrations", says the A level student, who hopes to eventually take a degree in computer science.

"In many ways they are often like individual works of pop art".

Misses missing out!

IS computer studies rapidly becoming a boy's subject?

According to the Equal Opportunities Commission (EOC), the answer is most definitely yes.

In an attempt to rectify the situation, the EOC is sending every secondary school a pack of books, leaflets and posters, in the hope that teachers may use them to encourage more girls to learn about computers.

A poster included in the pack urges girls to consider how they may be risking excluding themselves from a wide range of job opportunities if they fail to keep up with information technology at school.

Also included is a book of case studies of women working with computers, in an attempt to give girls the confidence they need to have a chance in the "second industrial revolution".

MSC choose BBC

THE BBC Micro is to feature as a major training aid in Manpower Services Commission courses.

A two-year experiment has been carried out for the MSC by Coventry education authority. As a result, the BBC Micro has been chosen as the main vehicle for comptuer based learning.

According to Mr Len Gould, of the MSC's computer-based training unit, the deciding factor was the wide availability of the micros throughout Britain.

Originally, training programs were written for Control Data's dedicated CAL system, Plato. But this is now considered too sophisticated for general use.

A team of programmers is re-writing the Plato material in BBC Basic.

Their next step will be original training software for the BBC Micro.

BBC prizes

WALLS Ice Cream is running a contest with BBC Micros and Electrons as prizes tied in with the launch of a new ice lolly, the Megabyte.

Twenty five BBC Micros are offered as prizes in a contest aimed at schools.

And 50 Electrons can be won by answering a few simple questions printed on the lolly wrappers.

25 BBC MICROS TO BE WON!

WALL'S ICE CREAM AND ACORN COMPUTER INVITE SCHOOLS TO DEVISE A COMPUTER GAME

Here's a great chance to win one of 25 BBC Microcomputers (B) for your school.

To celebrate the launch of the new MegaBytes lolly, Wall's and Acorn are offering these superb micros free to winners of this 'Mega' competition.

The competition is open to all UK primary, secondary and special schools.

To enter, each school team must:

1. Devise a computer game program which features ice lollies and;
2. List as many words as possible using letters from the phrase: 'Wall's and Acorn'.

There is no limit to the number of entries per school but each entry must be accompanied by fifteen MegaBytes lolly wrappers and arrive by 28 July 1984 at MegaBytes, PO Box 4XZ, LONDON W1A 4XZ.

Entries will be judged by a young computer games author and a team of professional programmers from Acornsoft. Points will be awarded for originality; quality of graphics; speed; sound effects; playability and overall presentation with attention to detail.

To win a computer, your school entry must have a high scoring game program and a sufficient number of words.

FULL RULES

1. Entries can be submitted on cassette or disk and written in either BBC Basic or machine code, each entry being signed by the teacher of computer studies or head teacher of the school. Entries should run on a BBC Microcomputer Model B or Acorn Electron.
2. All games must be clearly identified and accompanied by a full printed listing as well as a games catalogue style description of the game (not more than 200 words). The cassette/disk and listing should each carry the entrant's name and address.
3. Each school may only win one prize, irrespective of the number of entries of games submitted. Entries will be acknowledged upon receipt but not returned. Correspondence will be entered into at the absolute discretion of the promoters.
4. The entry instructions constitute part of the competition rules and are binding upon entry.
5. Responsibility cannot be accepted for entries lost, damaged or delayed in transit to the competition address. Illegible or altered entries will be disqualified, as will those not conforming to the entry instructions.
6. Entries will be judged by a panel of judges which will contain at least one independent member not connected with the promoter. The decision of the judges will be final and legally binding and in all respects of the competition the decision of Birds Eye Wall's Limited shall be final.
7. Copyright in all material entered rests in Paragon Communications on behalf of Birds Eye Wall's Ltd., and Acornsoft Ltd.
8. Winning schools will be notified as soon as possible after the closing date. A list of winners will be sent to anyone who encloses a stamped addressed envelope with their competition entry.
9. Entry is open to all qualifying UK residents except for employees of Birds Eye Wall's and Acorn Computer, their advertising and promotion agencies, or anyone directly connected with the competition or their families.

Wall's

New MegaBytes

ACORN COMPUTER

Enhanced *GDUMP launched

*AN improved version of *GDUMP, the printer dump ROM from D.A. Computers, has been released.*

The main change is the addition of a Mode 7 dump designed for use with Epson printers.

Although not offering the sideways and enlargement options available in other modes, the various styles of print available, such as condensed and emphasised, can be used to produce enhanced dumps.

There is also an option that allows the dump to be used with the Teletext Adapter.

MUSE course

MUSE – Micro Users in Education – will hold its annual summer course at Nottingham University from July 23 to 25.

The lectures and mini-courses, many of them aimed at beginners, will cover such subjects as simple BBC Basic programming, software evaluation, computer assisted learning, and networking the BBC Micro.

The whole range of education will be featured from primary schools to university and from teacher training to remedial teaching.

For further information contact Diane Thomson at MUSE, PO Box 43, Hull. Tel: 0482 20268.

Educational software boom goes on

EDUCATION continues to provide a rich market for software houses.

Latest entrant to the field is Resource Facilities with computer aided table learning in the form of a bingo game.

Included in the cassette based package are the bingo cards and markers to equip an audience of at least 30 children.

They play the game while they watch the large on-screen numbers being generated in the form of number bonds.

Meanwhile Dial have released Child's Play Pack and Spellwell.

The first, aimed at the young child, includes speech routines for micros with the appropriate hardware.

It consists of four separate games to test maths, spelling and shape recognition.

The second is for all age groups and consists of a database of some 1,200 words with varying levels of difficulty.

Specifically designed to cater for the 3 to 6 year age group, the newest product from Bourne Educational Software is called Happy Writing, a stablemate to Happy Letters.

As its title suggests, it is designed to teach writing skills using a "Magic Pencil". Extensively tested in schools, its colourful graphics hold the children's interest.

All are available on cassette. However Wordskill, which is from Chalksoft, is only available on disc because of its size. It tests for missing words in one of several million possible phrases.

Chalksoft's Words and Pictures is cassette based and is aimed at early readers, testing the child's ability to match random words with four different pictures on screen.

Dial Soft
for BBC Micro (32K) & Acorn Electron
child's play pack
Dial Soft educational software
spellwell!
for BBC Micro (32K) & Acorn Electron
1. Choose one of 5 Levels containing a total of 1200 words
2. Set up your own word!
3. Test your spelling!
Dial Soft educational software

Business takes off, too

THIS looks likely to be the year the BBC Micro really takes off as a business machine.

More and more software houses are now turning their attention to the small business user.

London based CYB have just released two packages, a payroll program which calculates wages, tax and insurance for up to 600 employees, and a separate mailing list program.

Over in Romford, Software for All has released four disc based programs dealing with stock control, invoicing and sales and purchasing ledgers.

Database back on TV

BBC Micro users all over Britain had the opportunity to record a burst of data, beamed out especially for them, when Thames TV's Database programme returned early in June with a six-part series.

Other goodies in the TV series include a look at what's new overseas, with a feature on software pirates in Hong Kong, and a visit to Japan, where you can buy all the bits and pieces to build your own computer – over the counter.

Also in Japan, Database is covering such innovations as the MSX micro.

The fifth generation project, aimed at creating a thinking computer responsive to voice commands, is also featured.

This is the first time that Database has been seen outside London. Joining regular presenter Tony Bastable are Jane Ashton, of Apple, and educator Dr Mike Thorne.

PACK PIX INTO CHIPS

VIDEO digitisers, previously used mainly in scientific and industrial applications, are becoming more popular with hobbyists, including BBC Micro owners.

Digitising breaks a visual image down into a series of electronic signals which can be stored or printed out as a picture.

The one pictured is from RH Electronics of Cambridge.

It is sophisticated enough, they say, to be used in scientific applications, yet simple and cheap enough to own one just for fun.

The price is £250. Users also need a video source such as a video camera or recorder.

Monsters in the BBC Micro

HORROR, surprise, shock! horror! The BBC Micro is about to make its users' flesh crawl.

A computer game based on The Evil Dead – a spinechilling film which broke box office records – is soon to be available for the machine.

It is being launched by a new company – Palace Software – who are planning a series of games developed from successful movies.

The Evil Dead tells the story of a group of naive teenagers trapped in an isolated cabin by ancient spirits of the undead. One by one they become possessed, turning into demonic monsters intent on destroying the living.

And the game version closely follows the plot of the film.

It begins with the player attempting to prevent the evil spirit from entering the house and increases in pace as the inhabitants are transformed into ghouls.

Graphics way to analyse quizzes

TWO new programs have been brought out for the PL graphics system, now used in more than 1,000 British schools. They cost £10 each.

The Questionnaire Analysis package enables BBC Micro users to enter hundreds of items of information into the computer quickly and accurately.

The information is first recorded as ticks in boxes on a questionnaire grid. These are then located and recorded by the graphics pad.

That way, claims the makers, Dollamore, scores of questionnaire sheets can be processed in an hour.

This then forms the basis for a simple frequency analysis, which can be saved on tape or disc or printed out as hard copy.

Typical applications are market research and traffic surveys.

The package contains guidelines for designing new questionnaires. There are also listings and subroutines to enable users to adapt the software to their own needs.

236
STABLE
1 KG 100G TARE ZERO HELP
MICROSCALE

Teacher's network has school in mind

AS head of computing at a Yorkshire high school, Peter Thorne found he was spending less and less time actually teaching.

The problem was that he was always having to disconnect the department's solitary printer from one micro only to have to connect it to another.

"By the time we had three micros, I had had enough", he told *The Micro User*. "And I was convinced that many other computer science teachers must be in the same position".

So the departmental head of Barlby High School, Selby, decided to do something about it.

The end result is the Thornet II, a network system for the BBC Micro with the harassed teacher in mind.

And such has been its success that systems have already been sold to a dozen other schools across the country.

Thornet II allows one BBC Micro with disc drive to act as a file server for any number of satellite BBC machines, so enabling them to share peripherals such as a printer.

As the software provided is not written in Basic, it can be loaded transparently at any time from the disc machine, without disturbing the Basic program in the satellite machine.

"We feel that it is not only a lot cheaper, but works better than Econet", claims Thorne.

It can only be used to transfer listable programs automatically, though text files can be transferred easily if Wordwise or View is available.

Digital balance for BBC Micro

A DIGITAL weighing balance which plugs straight into the BBC Micro's A/D port has been brought out by a Cambridge firm of instrument makers.

Aimed at scientific and educational users, the Microscale is designed to weigh items of up to 1 kilogram with a resolution of 1gm and a response time of under a second.

Users can also choose a 100 gram range with a resolution of 0.1gm. Maximum error is typically 0.2 per cent.

The keyboard is used to select operational modes, set zero and select a tare facility if desired.

Makers Cherlyn Electronics say they found the BBC Micro an ideal host system.

They are now developing software for a wide range of applications.

The Microscale costs £150. But Cherlyn say it has operational features that up to now have only been found in far more expensive instruments.

BARRY WOOD'S TAILPIECE

NOW that the 6502 Second Processors are about in numbers we've been able to poke the ROM's innards, and have found some fascinating little messages such as

This is not a language

and

I cannot run this code

The only thing that appears to be missing is **I'm sorry for being late**

* * *

HAVE you noticed the amount of publicity two of A&F's directors have been getting recently with their crack down on piracy?

Not only are they regulars on *Micro User's* news pages, but they've got into the weeklies, dailies and even television.

Rumour in the trade is that the way they're going, they'll be on Page 3 of the Sun next . . .

* * *

OUR editor is totally infatuated by his two latest pieces of kit.

He keeps wandering round saying how beautiful his Second Processor is, and telling us all to be "nice to those wonderfully clever people at Acorn".

Even worse is his relationship with Microweb. We just can't tear him away from it – which may be why this issue is better than the last.

Last night he was rhapsodising to me about Microweb's virtues while he was frantically typing to some other fanatic courtesy of Telecom.

"Brilliant", I agreed. "You know, one day someone's going to invent a way so we can input and output speech via the computer and send it over the lines to each other".

I swear, he hasn't worked it out yet . . .

* * *

ACTUALLY things may improve. Acorn has just announced a new policy of not commenting on a new product until "it's ready".

Trouble is, no one will tell us when the announcement comes into effect . . .

* * *

AT least it's keeping him out of the pub. Unlike the other editors.

We're thinking of blowing special language ROMs for them featuring statements like

INPUB

and

ON ERROR GOPUB

* * *

NOTICED the mag for squirrels labelled its article on the Z80 the ZX80?

Which just goes to show – never take anyone for granted.

And I thought they wouldn't be able to surpass printing two blank pages . . .

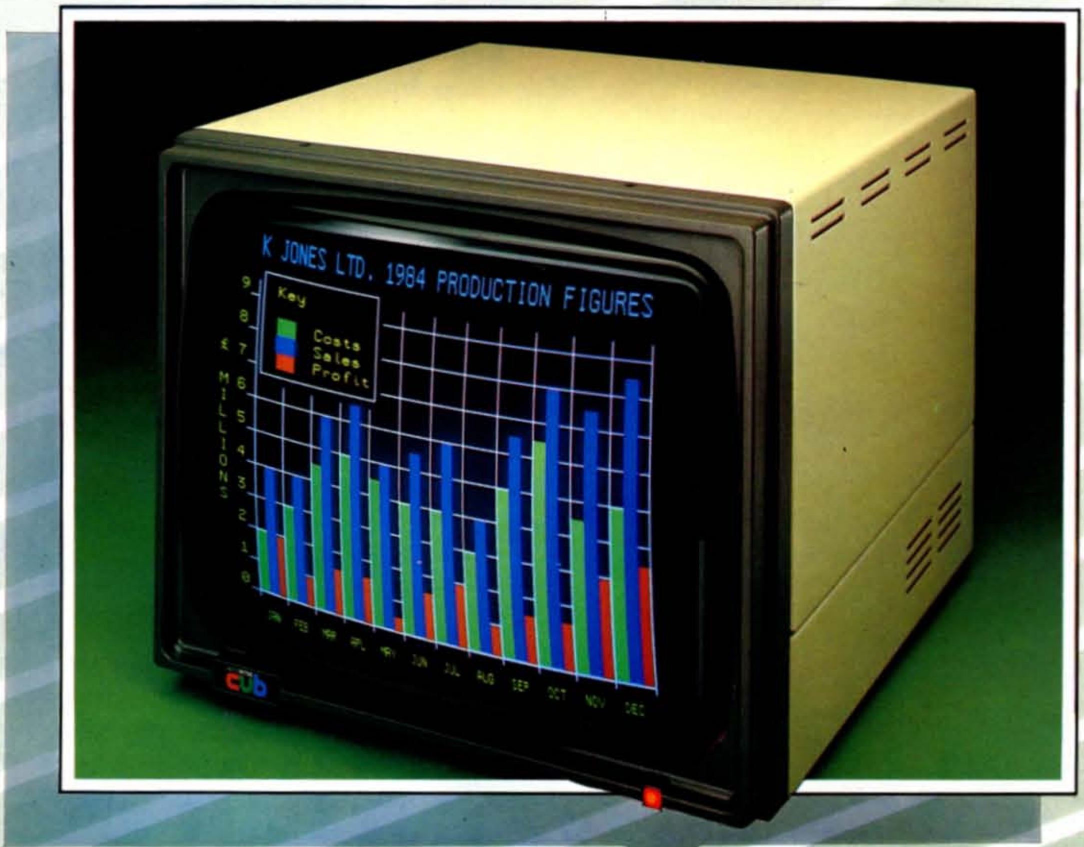
* * *

MIND you the second coming caused lots of comments on the Technical Advice Stand at the last Electron & BBC Micro User Show.

Well received was the query: "If the second processor's so fast, why have I been waiting so long for it?"

However the all-time winner was: "Why 6502 Second Processors? Surely 6500 would have been a rounder number?"

SERIOUS DECISIONS NEED THE SUPPORT OF OUR 80 COLUMNS



Most serious users of micro computers require the facility to display in 80 columns, especially for word processing. Try this on most monitors and the result will be a frustratingly fuzzy image.

The Microvitec CUB 653 gives the user not only glowing colour, but also pin-sharp images, thanks to a medium resolution screen 653 pixels wide by 585 high, plus a selective transmission panel giving super-high contrast. These features make this model from the CUB range of monitors the perfect partner for the high resolutions generated by BBC B, SINCLAIR Q.L., I.B.M., ELECTRON, ORIC, APPLE II and IIe, and many others.

So if you wish to sharpen your image, whether in the office or at home, decide Microvitec:

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Microvitec Monitors are available from your specialist local computer dealer, selected branches of W. H. Smith, John Lewis Partnership, Lasky's, John Menzies, Greens at Debenhams and other leading retailers.

Small business can now stop going by the book.

For under £1,000 a small business can now equip itself with a BBC Microcomputer, a disc drive, a word processor and printer.

(All tax deductible by the way.)

Once you've parted with that money, you'll find that business has never been brisker.

Because now, there's a new series of floppy disc software specially for the smaller business.

It has been developed by Acornsoft, the software division of Acorn Computers who are the manufacturers of the BBC Micro.

For only £24.95, each disc can store volumes of vital bookwork which can be updated and amended in a fraction of the conventional time.

And there is a disc to cover most aspects of paperwork and book-keeping.

The Invoicing package.

This program stores details of products, VAT numbers and, of course, the names and addresses of your customers. As orders come in, you simply record them. Then, when it's time to invoice, you just press a few keys and each invoice or credit note is printed automatically in seconds.

Allowing for variable terms of trading, the system calculates and prints discounts. And it should help to improve your cash flow dramatically.

The Order Processing package.

With this program, you can confirm your customers' orders, prepare and print despatch notes and make fast analyses of individual orders or of all the orders stored on disc.

ORDER PROCESSING

The Accounts Receivable package.

Now, it couldn't be easier to keep your customer accounts under control.

In an instant, you can analyse debtors, produce statements, keep a check on any credit limit and calculate VAT output automatically.

ACCOUNTS
RECEIVABLE
ACCOUNTS

Using this package in conjunction with the invoicing package, you can also keep tabs on payments received against payments outstanding.

The Accounts Payable package.

This package will keep you fully up-to-date on how much you owe and who to. In addition, it calculates

ACCOUNTS
PAYABLE
ACCOUNTS

input VAT and, used with the Accounts Receivable package, produces instant VAT returns.

It also highlights settlement discounts, produces remittance advices and provides an immediate analysis of all creditors.

The Stock Control package.

-STOCK-
CONTROL

Touch a few keys and you have instant access to stock status and automatic analysis by quantity and value.

Consequently, it's easy for you to maintain correct stocking levels, having an early warning of out-of-stock situations or the likelihood of over-stocking.

The Purchasing package.

Purchasing

All your suppliers' names and addresses go onto the disc. Then they can be retrieved instantly for preparing and printing orders.

All order data can be recalled in seconds, allowing you to check on orders, and suppliers' invoices and to record all deliveries.

The Mailing package.

Mailing
System

Instead of the shotgun method of sending mailshots, this package enables you to refine each mailing down to the customers who are most likely to respond.

It gives you a rapidly accessible mailing file of your customers, according to any criterion you choose. Size of company, for instance, or type of business. Average value of the business they do with you, or whether they are good or bad payers.

Then, when you are doing a mailing, you simply choose the group or groups of customers you want.

At £24.95 each, these packages could be priceless.

Each package comes with clear instructions on how to get the program running so that you can devote much more of your time to more profitable activities.

If you're a credit card holder, you can order any or all of the packages by ringing: 01-200 0200 anytime. Or 0933 79300 during office hours.

(By ringing the same number, you can get the address of your nearest stockist, or full details of the BBC Microcomputer system if you don't already have one.)

Alternatively, you can order the packages by sending the order form below to: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Please allow 28 days for delivery.

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Order Processing			SNB 12
Accounts Receivable			SNB 10
Accounts Payable			SNB 13
Stock Control			SNB 11
Purchasing			SNB 14
Mailing			SNB 09
	TOTAL		

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Of course, we have the classics like THE HOBBIT (text only) £14.95 and PIMANIA (win £6,000!) £10.00 and the 747 FLIGHT SIMULATOR (*"the best"*) £8.95. But we also have, among others ...

WHEEL OF FORTUNE *"Quite simply the best adventure I have seen for the BBC Micro ... the advances in programming that have been made are amazing ... this has to be THE ADVENTURE OF 1984"* (Micronet 800). 250 locations - EVERY ONE WITH HALF-SCREEN GRAPHICS! Commands of up to 254 characters! Moving cast with varying moods! Save your position to tape or disc! Very fast response. NO STIX. **(Epic) £9.95**

FOOTBALL MANAGER The best Spectrum Football program is now enhanced for your Beeb! *"An excellent simulation, enjoyable to anyone with the slightest interest in soccer"* (PersCompNews). *"The truly addictive quality of this game is the remarkable way it mirrors a real football manager's problems"* (PersCompGames). 7 skill levels: animated colour graphics: plus a Customize feature which lets you include your favourite teams and players! NO STIX. **(Addictive) £7.95**

OVERDRIVE The most exciting car-race we've seen for the Beeb! You are in a multi-stage 3D race for the World Drivers Championship. There are 5 stages - day, night, snow, desert, riverside. To qualify for the next stage, you must finish in the first 12. On-screen score, time and speed and bonus. Impossible to convey in words just how realistic and exciting this great graphic game is!
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EAGLE'S WING Watch from above as your strike plane attacks a heavily guarded river canyon. Good full-screen graphics and a great sensation of flying down a canyon. You must destroy enemy pillboxes, patrol ships, missile silos and command centres on islands in the river. Docking with your refuelling plane is critical - but dock gently!
NO STIX. **(Software Invasion) £7.95**

HUNCHBACK *"Extremely good version of the arcade game ... thoroughly recommended"* (Beebug). The only authorised Beeb version - excellent too. Try to rescue Esmerelda, avoiding the boulders, the arrows and the spears of the guards. Choose any of the 12 screens to practice on. Hall of Fame. Choice of starting speed. Absolutely superb graphics! STIX OK. **(Superior) £7.95**

TRAFALGAR Totally original new game, as you command your way through the graphic battle of Trafalgar. Great full-screen overhead line-of-battle pictures, as you choose your enemy ship and then sea-level viewpoint as you watch the two ships fight to the death. 1 or 2 players. FIRESHIPS can be launched (and blown up, if you're smart): your broadsides are very controllable and the graphics are very watchable. It makes a nice change from the space race.
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BLAGGER Brand-new 20 SCREEN fully animated graphic game. (It's quite a lot like M*N*C M*N*R, actually.) Beautiful graphics, the screen is alive with movement as you try to collect keys to the safes. Each of the 20 screens is a different puzzle, with a different solution. Will your burglar make it? You'll certainly make him try for weeks! NO STIX. **(Alligata) £7.95**

FORTRESS Too new for reviews, this **'ZAXXON'** -type game works beautifully on your Beeb. As Pace say ... the Fortress awaits you. It is a classic computer game, in a smashing 3D graphic form. All the features you would expect, plus a Hall of Fame. Fast and furious. STIX OK. **(Pace) £8.95**

TWIN KINGDOM VALLEY *"Sure to become a classic ... an involved and difficult adventure ... the excellent graphics add to the enjoyment"* (MicroAdventurer) Not only a great adventure, but all 175 locations are drawn in hi-res graphics - and some of the beautiful drawings contain clues. 36 commands: realtime adventure with 6 control options. Rapidly becoming OUR BEST-SELLER! NO STIX. **(Bug-Byte) £9.50**

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BBC Micro

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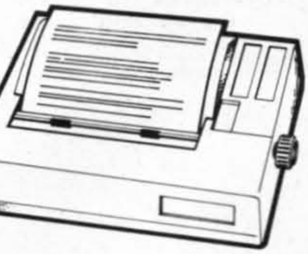
NEW

KAGA KP810



This new JAPANESE printer has EPSON FX/RX compatible commands. 140 CPS Dot matrix Printer, offers **NEAR LETTER QUALITY** print in a 23 x 18 dot matrix in addition to the standard Epson style type-faces on the 11x 9 matrix. Friction feed, Adjustable tractor feed, Single sheet feed and built-in Paper Roll Holder. Normal, Italic, Enlarged, Condensed, Super and Subscript, Dot addressable graphics (8, 9 and 16 pin modes). Proportional spacing. (Optional extra: Down loadable character set in 8K ROM or RAM). NEAR LETTER QUALITY print, selectable at switch on. 10" maximum width, bi-directional, logic seeking. 3K Buffer. Half speed quiet mode. Convenient Paper-out sensor switch. Centronics Interface standard. All this plus our no quibble 12 months warranty.

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Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, etc., Printers.

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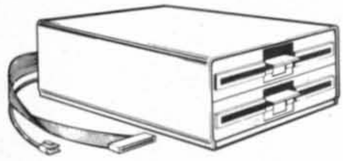
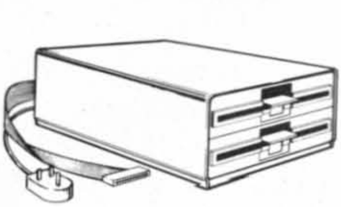
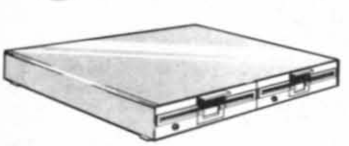


- **CLS 100** Single, TEC Single sided 40 track 100K, 5¼" Disc Drive **£119**
- **CLS400** Single, Mitsubishi Double sided 80 track 400K, 5¼" Disc Drive **£179**
- **CLS400S** Single, Mitsubishi Double sided 40/80 track Switchable, 400K, 5¼" Disc Drive **£215**
- **CLD200** TEC Single sided 40 track 200K, twin 5¼" Drives **£245**
- **CLD800** Mitsubishi Double sided 80 track 800K, 5¼" TWIN Drives **£359**
- **CLD800S** Mitsubishi Double sided 40/80 track switchable, 800K, Drives **£399**

(CUMANA) DRIVES CASED WITH PSU & CABLES





- **CS100** TEC Single sided 40 track 100K 5¼" Single Disc Drive **£143**
- **CS200** TEC Single sided 80 track 200K 5¼" Single Disc Drive **£205**
- **CS400** Mitsubishi Double sided 80 track 400K 5¼" Single Drive **£225**
- **CS400S** Mitsubishi Double sided 40/80 track 400K 5¼" Single Drive **£340**
- **CD200** TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£269**
- **CD400** TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£365**
- **CD800** Mitsubishi Double sided 80 track 800K 5¼" TWIN Drives **£425**
- **CD800S** Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£465**
- SPARE DRIVE CABLES, SINGLE **£6;** DUAL **£8**
- DFS Manual (comprehensive) **£7.50** (No VAT)

P.S.

1. You do not require Formatting Discs when using our DFS as the formatting program is in the ROM, nor do you require expensive 40/80 track switchable drives as with our DFS you can read and write 40 and 80 track discs in an 80 track drive (software switchable).

2. **MITSUBISHI** SLIMLINE DISC DRIVES that we supply are Double Sided, Double Density 5¼", 1 Megabyte. (With BBC Micro 400K after formatting.) When used in conjunction with Double Density board one obtains 800K (approx) after formatting. Track density 96 TPI, track to track access time 3mSec. These drives are very fast, quiet and efficient. We strongly recommend their use.

5¼" DISKETTES

(Lifetime warranty)

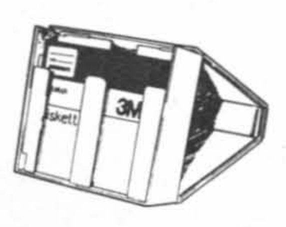
Why settle for less, Buy the best.

- 10 Verbatim or 3M Diskettes S/S D/D **£17**
- 10 Verbatim or 3M Diskettes D/S D/D **£28**

DISC ALBUMS

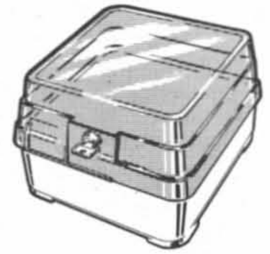
Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 discs in double-sided clear view pockets. ONLY **£4.95**

PLASTIC LIBRARY CASES



for Disc Storage 5¼" (holds 10) **£2**

LOCKABLE STORAGE UNITS



Attractively finished, strong beige plastic base fitted with dividers. Smoke acrylic top. Supplied with adhesive title strips for ease of filing.

- M-35 Holds upton 35 mini discs **£14**
- M-85 Holds upto 85 mini discs **£18**

FLOPPY HEAD CLEANER KIT

Unless your office/home is dust free, you should clean heads at least once a week to avoid the risk of cross contamination.
Simply apply the cleaner to one of the specially formulated cleaning discs, insert into the drive and initialise. If your system has no initialisation program then insert the disc and open and close the door 5 times.

£16.00

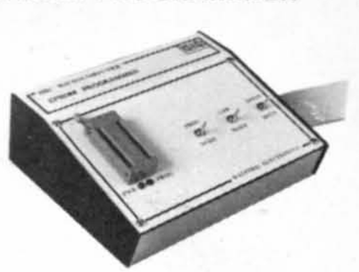
MONITORS

MICROVITEC 1431
14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **Special Offer £174**

- **MICROVITEC 1451** Hi-res 14" Monitor incl. lead **£295**
- **NEW MICROVITEC 14"** Colour Monitor/Composite Video **£249**
- **KAGA RGB** 12" Medium Resolution Colour **£195**
- **KAGA RGB** 12" High Resolution Colour **£259**
- **KAGA** 12" Standard resolution colour MONITOR/COMPOSITE VIDEO **ONLY £195**
- **BNC** Connecting Lead **£3**
- **RGB** Connecting Lead **£5**
- **ZENITH 12"** High resolution, jitter free picture, Amber or Green **£75**

Carriage on Monitors £7 (Securicor)

EPROM PROGRAMMER



At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2716 — 2516 — 2532 — 2564 — 2764 — 27128.** Our Programmer has been designed to make sure the EPROMs are neither programmed too fast nor too slow; just at the right speed as recommended by the manufacturers of the EPROMs (any deviation in timings can burn their brains out).
This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

- **COMPLETELY SELF CONTAINED –** Housed in its own sturdy case – Uses its own power supply – connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT –** Comes complete with simple to use fully machine code ROM based software and easy to understand manual. Facilities include Varification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does not simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE –** Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 TUBE and PRESTEL
- Allows more than one program to reside in an EPROM using the ROM Filing System.

ONLY **£89** incl. Manual (£3 carr.)

TEX EPROM ERASERS

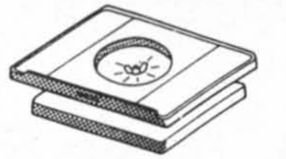
EPROMs need careful treatment to survive their expected lifetime. Rushing it could burn their brains out. So cop-out of this helter-skelter world; take it easy the TEX way and give your chips a well earned break. Cool, gentle and affordable. EPROMPT does it properly.

Two versions available:

- **EPROMPT EB –** The standard version. Erases up to 16 chips. **£30.00**
- **EPROMPT GT –** Erases up to 28 chips. Has an incorporated safety switch which automatically switches off the UV lamp when the Eraser is opened. **£33.00**

Spare 'UV' Lamp bulbs. £9

SWIVEL MONITOR BASE



Attractively finished in beige, our swivel base allows you to tilt/swivel your Monitor to any required angle for comfortable viewing.

ONLY **£18**

Continued →

MK 2 13 ROM SOCKET EXPANSION BOARD

Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. This board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, etc. (At Watford, we think ahead.)

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

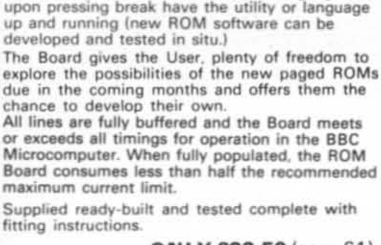
ONLY £32.50 (carr. £1)

EPROMs & CMOS RAMs

2764-250nS (8K ROM)	**£5.95**
27128-250nS (16K ROM)	**£24.00**
6116-150nS (2K RAM)	**£6.50**
6264-150nS (8K RAM)	**£36.00**

BEEB SPEECH SYNTHESISER

Versatile Speech Synthesiser Unit for the BBC Micro



SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

Only £44

THE ULTIMATE DFS FOR BBC MICRO

by

Watford Electronics

Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money – *Beebug Aug. '83*
A very worthwhile package – *The Micro User*
You'll be buying a very powerful package – *Personal Computer News*
Superior DFS; Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

● The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

● A FORMATTING PROGRAM is built in, permitting formatting to 35, 40, 80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

● A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

● A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.

● A double step mode allows the User of 80 TRACK DRIVES TO READ & WRITE BOTH 40 and 80 TRACK DISCS. This mode is software selected for each drive individually, thus enabling a 40 track disc to be copied on to an 80 track very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE 40/80 TRACK SWITCHABLE DRIVES.

● A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

● When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

● Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.

● An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

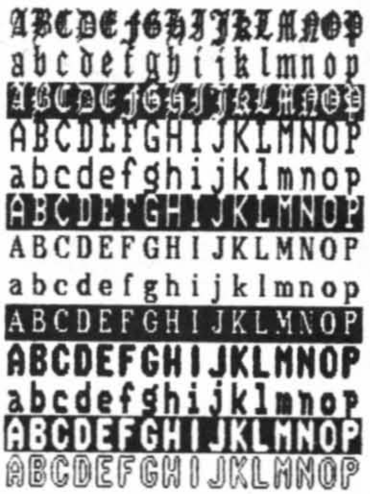
● RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.

● OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.

Continued:

BEEBFONT ROM

BEEBFONT is a remarkable new concept in BBC software, exclusively available from Watford. Once fitted, the 16K ROM will enable you to produce attractive text displays in following different styles:



★ **It works in modes 0, 1, 2, 4, using full colour.**
★ Simply use Ctrl–V to select the font and all further screen output will be in a new style.
★ Even the ordinary Beeb character set can be enhanced by doubling height or width and emphasising to give bold print.
★ A comprehensive editor is included which enables the user to design his own characters.
★ A spooling program is provided, which enables pre-formatted text files to be displayed on an EPSON FX, RX, and NEC Printers, using the full range of character styles. (Please specify printer type when ordering). Can be used with WORDWISE.
★ This really must be one of the most original and exciting products of the year.
★ A twenty page manual is provided and the demo/editor software comes on disc or cassette (please specify when ordering). **ONLY £39**

DFS continued:

● 2K of RAM can be reclaimed from the DFS by setting "PAGE" to & 1100.

Now with extra features:

● The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.

● Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as £1100 under most circumstances.

● To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO *A* gives information on all files in the current directory which have an "A" anywhere at all in their filename.

● Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

● Fully compatible with BBC TELETEX and TORCH Systems.

DFS ROM ONLY **£29**
Complete Disc Interface Kit including DFS ROM and fitting instructions. £99
Comprehensive and clearly written DFS Manual. **£7.50 (No VAT)**

P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for the highly sophisticated Watford's DFS ROM for **ONLY £25**

Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail through any Dealers.

WATFORD'S BEEB PRINTER ROM

"Makes Printing Childs Play"

Are you fed up with not being able to unravel your printer manual and use all those features you paid for? Need sensible paging for use in the creation of booklets? Then you certainly need our Beeb Printer ROM.

A machine code printer utility in ROM.

- 'Single' key operations replace control code sequences for underline, font and size selection, paper movement, etc. Up to 30 come pre-defined, without effecting normal fn key usage.
- **This rom allows easy control of your printer from 'Within' WORDWISE text. Instead of long escape sequences, you just 'OC' a single number to Select, Underline, Print Styles, etc.**
- Automatic fanfold page margins. Puts gaps in listings. PRINTed text etc to skip the folds. The gap size alternates to minimise paper wastage when using binders.
- Form feed and related commands, made available on ALL printers. Can also provide a left margin.
- User defined characters embedded within text are printed as on VDU.
- ★Commands select option for GP100, STAR, NEC, MX/FX, LP VII/DMP100, DMP200. Operates with Parallel and Serial Printers.
- Fully functional with the popular WORDWISE wordprocessor.

Supplied complete with a comprehensive 50 page manual.

Price: £24

(When ordering, please specify printer type)

NEW LAUNCH
DUMPOUT 3

A highly sophisticated machine code ROM providing screen to printer dumps in any mode, plus window setting utilities and two new OSWORD calls that allow you to use the Beeb graphic coordinate system for plotting or testing mode 7 'pixels'.

*GIMAGE Ultra sophisticated dump of any graphic screen, using up to 8 tones.

Handles **FULL MODE 7 text,** graphics, double-height and colour and mode 8. 14 optional parameters, using 'prefixing' so that you only need specify the ones that you want. The parameters include:

- V<scale>, H<scale>. These are both 2 byte numbers giving you very fine control over the dump size from minute to enormous. Unlike other dump Roms, scale does not vary with screen mode.
- R <0-3> Dump rotation 0, 90, 180, 270 degrees.
- I<indent> Set gap from left edge of paper.
- X <min> <max>, Y <min> <max>. The area of the screen dumped is that in the graphics window, alternatively these parameters may be given.
- P Physical colour values used for dumping. (Otherwise use a negative scale, i.e. white prints darkest.)
- T Two tone dumps for higher resolution.
- M <mask> 8 bits controlling colour masking.
- E Contrast expansion. Makes mode 7 text characters and separated graphics stand out more clearly from the background.
- C All mode 7 graphics printed as reduced size dumps.
- *GWINDOW Draws graphic window on screen, its size and position can then be altered using the cursor keys.
- *TIMAGE <indent> Does a fast, text only dump of the text window in any mode.
- *TWINDOW As GWINDOW but for text.

DUMP OUT 3 gives you ALL of the GIMAGE facilities listed above and GWINDOW in mode 7 as well, not just hi-res modes.

Ideal for CP80, GP80, DP100, GP250, STAR, KAGA/TAXAN, NEC, SHINWA, CP80, GEMINI, EPSON MX/RX/FX, LPVII, DMP100/120/200/400 Printers.

Comprehensive Manual included. Only: **£19**

WATFORD JOINS THE COMMUNICATION REVOLUTION

MODEM 84

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

With the launch of Watford's MODEM 84 you can now hook into PRESTEL, MICRONET, HOMELINK, TELECOM GOLD, etc., for about the cost of a good tape recorder. Prestel gives you access to an incomparable database covering almost every subject under the Sun. There is Micronet with lots of free programs that you can download and run. Details of Clubs and User groups, a diary of meetings and exhibitions, news and reviews, technical information, etc. There is Homelink with On-line banking. And there is armchair shopping, travel information, Entertainment, World News, Sports News, Business News, Weather information, Electronic mail and lots more. The basic Prestel subscription is only £5 per quarter for domestic user and at off-peak times there is no charge for access time. Can you afford not to be part of this revolution?

Now using the latest techniques and the new generation of Modem chips, Watford have developed a Modem that is newer, better and yet cheaper than any on the market.

Compare the Specifications:

MODEM

- Direct-connect Modem using BT approved isolation components.
- Full Duplex V23 operation for Prestel and TELECOM GOLD operation (1200/75 Baud).
- User-to-User half duplex 1200/1200 Baud operation with AUTOMATIC SEND/RECEIVE switch (BEWARE – most MODEMS switch manually between send and receive, which precludes the use of intelligent user-to-user software).
- Simple single button operation and comprehensive LED status display.
- Attractively finished. Sized to sit on the Disc drive.

P
PRE
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L

NEW SUPER PRESTEL INTERFACE ROM

Fully compatible with Watford's MODEM 84 as well as with PRISM and most other Modems.

- Supports full Prestel Colour Alpha and Graphic Characters including Double Height, Flashing, Conceal/Reveal.
- Called by simple *PRESTEL command. Disc and Tape configurations fully supported.
- Telesoftware downloader included.
- Comprehensive MAILBOX facilities including offline editor.
- Auto Logon sequence, can be burnt into ROM if desired.
- Unique "TAG" facility allows tagging and recall of interesting pages – avoids the common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- Page load and save to tape or disc. Pages are automatically saved under Page Number reference in a 'FRAME' directory.
- Print page options are ASCII only (i.e. with supression of Graphics) – fast and works with any printer – as well as a full graphics dump for the popular Epson printer.
- 'USER' function call built into interface with specialist add-on routines (your own as well as ours).
- All the above facilities available from Function Keys. An overlay is provided giving simple yet comprehensive guidance to the key functions.
- Comprehensive instruction manual supplied.

PRICES:

SOFTWARE ROM incl. Comprehensive Manual	**ONLY: £20**
MODEM 84 (without software)	**£62**
MODEM 84, SOFTWARE ROM and Operating Manual	**£75** (£2 carr.)

(Please allow upto 28 days for delivery)

Coming soon:
BEEB User to User ROM. For automatic User to User communication including file/program transfer.

Please write to Watford Electronics for full details, Order and Application Forms.

NEW FX80 PRINTER DRIVER for VIEW

Do you want to use Italics or Enlarged Characters with View? French or German Characters? These and other FONTS from FX80 character sets can be accessed using our Printer Driver with VIEW. The disc contains an example as well shows how to use. Available on 40 or 80 track Disc. **ONLY: £7.50**

EPSON DUMP ROM

A specially designed Dump ROM for EPSON RX, FX and the new Kaga KP810 Printers. Will accurately DUMP all Screen modes including TELETEXT, GRAPHICS and DOUBLE HEIGHT. MULTITONE DUMPS are also supported. Simple single command (*SCDUMP) operation.

Only: £16

TINY PASCAL for BBC Micro £59

VIEW

Acorn soft's Wordprocessor ROM. **£52**

FORTH ROM for BBC

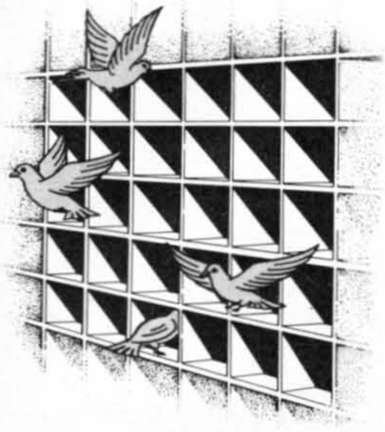
This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Manual included. **£33**

WATFORD ELECTRONICS

Continued →

WONDERFUL WATFORD

TWO DATABASE SOFTWARE for BBC MICRO



DISCDATA

At last for BBC Micro Disc users, Watford Electronics have produced 'DISCDATA' which must be the most versatile general database at the price on the market. The length of your files is restricted only by the space on your disc. You can have upto 20 fields with 'page' length records of upto 254 characters. The program is completely menu driven obviating reference to a manual although written guidance is given with the program. Add and delete records, amend title, field names and records, sort on any field and search for any record or group of records in any field. You do not need to abandon or rewrite your files if you wish to add additional fields or extend the length of any field, the program will rewrite the files for you. Your files can be in any drive. Output can be in 40, 80 or 132 character width with Printer routines. Two forms of output are provided for horizontal for label type output and a tabulated output with title and headings. What is more, the selected fields can be placed in any order on the screen. In the horizontal mode you can scan backwards or forwards with wrap around effect. Output can be started or stopped anywhere in the file. There is automatic totalling on decimal fields and an automatic count of the number of records output.
Now with extra 3 features: Allows string search; Calculations can be done on numeric fields; Create Sub-Files from the main File.

On disc at **Only £15**

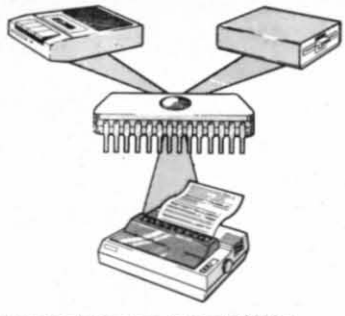
It has to be the best value.

FILE-PLUS

Now even more powerful with the added facility of a SHELL SORT on any field. This must make DATA-PLUS the most powerful and versatile Database to be found on BBC Micro.
A 16K ROM containing the most flexible and easy to use disk based Database system on the market. A database may occupy your total on-line storage capacity. You may design any number of data entry forms using a "paint" on screen technique. Forms may be upto 3 screens in size. A form may be used to Add, Delete, Update, Print and Spool records from your Database. Quick search facility on any text field. A query language provides full maths support (–, +, /, *, +–9999999999.9999) and compare facilities (=, >, <>, <=, >=, &, I) when used with the keywords – Assign, Compare, Display, End, Goto, Iff, Ift, Print, Read, Search, Spool and Update. Full printed output control via embeded commands. Supplied with 70 page manual and fitting instructions.

Only £43

BUFFER & BACKUP ROM



A very versatile firmware. An ideal ROM for engineers, programmers, teachers, students, etc.

★ Converts your Sideways RAM to a 4K or 16K BUFFER for a parallel printer. (Uses * FX5,3). (You no longer require to purchase expensive (£100+) Printer Buffers.)

★ Dumps selection of Disc files to Tape.

★ Makes backup copies of tapes onto Tape, Disc and Hobbit.

★ Displays contents of a chosen paged ROM on screen.

★ Menu display on 'shift-break' using ROM Filing System.

★ Comprehensive Manual

Simply a give away at **£18**

In keeping with our tradition of bringing you the best in BBC Micro at prices you cannot refuse, we are launching yet another of our ROM based software.

NEW LAUNCH ROM MANAGER

This unique piece of firmware has been designed to allow the USER to access the BBC Micro's Sideways Rom Paging facility to the full. The 18 Commands our ROM MANAGER adds to your computer are concerned with 3 aspects of ROM use:
1. ROM CONTROL – Ability to activate at random any of the ROMs present in the Micro.
2. BBC MICRO's STATUS – e.g. Checksum on any ROM, and the Filing system currently active.
3. ROM DEVELOPMENT – Allows main memory to be used like Sideways RAM.
The Commands available are:
*CHECKSUM – generates a CRC for the specified ROM.
*DIRECT – allows you to pass a particular command to the specified ROM.
*EXAMINE – allows examination of the named ROM.
*EXPLAIN – gives detailed description of the first 22 FX codes.
*FILE – passes the command directly to the currently selected filing system.
*FUNCTION – displays the string currently programmed onto the function keys.
*INCLUDE – allows the main memory to be used for developing ROM software without need to purchase expensive sideways RAM.
*MODIFY – any location in memory is displayed and can be modified with this command.
*NAMES – displays the names of any resident ROMs.
*RAM – allows the command to be passed directly to the 'RAM based ROM'.
*REMOVE – turns off the 'RAM based ROM' option.
*SPECIFY and *DEFAULT – specifies the default ROM and passes the named command to the default ROM specified.
*STOP and *START – allows the named ROM to be disabled or enabled, preventing clashes between ROMs.
*STATUS – provides information about the ROMs inside the BBC micro, including the socket number, the name of the ROM, its length, whether or not it is enabled and supports language or service entry points.
*VALUES – outputs information concerning the status of ROM MANAGER e.g. the socket number it occupies, the number of active ROMs with a higher priority than itself, the current filing system.
*VECTOR – the same function as *DIRECT, but provided in case *DIRECT clashes with other ROMs.
In our opinion this ROM is one of the most useful utility ROMs available on the market, and is a must for anyone using ROM based software.

Introductory Price: Only **£19**

GEMINI'S BUSINESS SOFTWARE

Cashbook Accounts	£52
Final Accounts	£52
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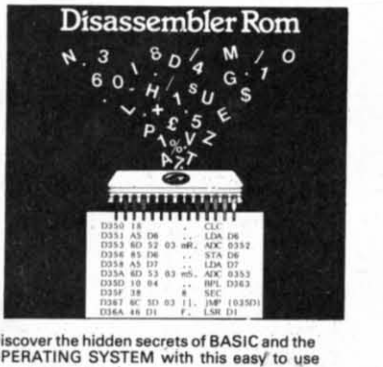

```
D350 18          .   CLC
D351 A5 D6       ..  LDA D6
D353 6D 52 03 mR.    ADC 0352
D356 85 D6       ..  STA D6
D358 A5 D7       ..  LDA D7
D35A 6D 53 03 mS.    ADC 0353
D35D 10 04       ..  BPL D363
D35F 38          8   SEC
D367 6C 5D 03 l].    JMP (035D)
D36A 46 D1       F.  LSR D1
```

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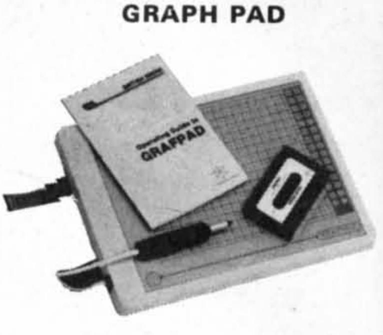

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Part 15 of MIKE BIBBYs introduction to programming

Hip, hip array for the subscripted variable!

I TOLD a lie last month! I'm not going to carry on with procedures straight away – there's an interesting and very useful diversion I want to take.

Look at Program I:

```
10 REM PROGRAM I
20 MODE 6
30 A$="TOM"
40 B$="DICK"
50 C$="HARRY"
60 PRINT "Hello " A$
70 PRINT "Hello " B$
80 PRINT "Hello " C$
```

Apart from being trivial – remember these programs are only meant to be illustrative – those last lines are a bit irritating – they're crying out to be replaced by a loop.

I mean that if instead of A$, B$, C$ you had 1, 2 and 3, you could do it with a loop, as in Program II:

```
10 REM PROGRAM II
20 MODE 6
30 FOR I%= 1 TO 3
40 PRINT "HELLO ";I%
50 NEXT I%
```

Unfortunately, powerful as the ability to use loops is, we need a numeric variable, and in Program I we are dealing with strings, TOM, DICK and HARRY.

It would be nice if we could somehow link our strings with numbers so we could use those numbers to refer to them – in a loop for instance.

In fact we can do this – and we refer to the number linked with the string as the index.

Take a look at Program III:

```
10 REM PROGRAM III
20 MODE 6
30 DIM string$(3)
40 string$(1)="TOM"
50 string$(2)="DICK"
60 string$(3)="HARRY"
70 FOR loop% = 1 TO 3
80 PRINT "Hello " string$(loop%)
90 NEXT loop%
```

Ignoring the details for a moment (in particular line 30) what we've done is to define three separate strings:

string$(1)="TOM"
string$(2)="DICK"
string$(3)="HARRY"

Now each of these string variables look very similar, in fact their beginnings are identical and they all end in a pair of brackets. The only differences between the three are the numbers in brackets.

And it's the numbers in the brackets that count – they're the way we distinguish each of the strings.

And now they have numbers associated with them, we can handle our three strings with loops – as we do in lines 70 to 90.

Line 80 reads:

```
80 PRINT "Hello " string$(loop%)
```

Initially *loop%* is 1, so line 80 prints out *string$(1)*. The next time through the loop, *loop%* is 2, so line 10 prints out *string$(2)*, a completely different string. I think you can guess what happens when *loop%* is 3 . . .

Variables linked to numbers in brackets are called subscripted variables. We call the numbers themselves subscripts.

In the case of Program III we say that the variable *loop%* indexes the subscripted variable *string$( )*.

Points to note about subscripted variables are:

- Up to the opening bracket, the

→

From Page 43

variable follows the normal string variable rules, ending with $.

- There's no space between the $ and the opening bracket.
- You need the final bracket.
- The subscripted variable has to be DIMmed.

DIMming is what we do on line 30. You see, we have to prepare the computer for subscripted variables. It needs to know what to expect, particularly the number of subscripted variables you'll be using.

To forewarn the micro, you use the DIM statement, followed by the highest subscripted variable you are going to use – in this case *string$(3)*.

Notice that when you're DIMming there are still no spaces between the $ and (.

If you want to use subscripted variables – and you'll want to a lot – you'll have to DIM them first.

There are several more tricks of the trade for using DIM, but we've got enough to be going on with.

In Program III we printed out subscripted variables with a loop. Program IV uses them to input information, too:

```
 10 REM PROGRAM IV
 20 MODE 6
 30 DIM string$(3)
 40 FOR loop% = 1 TO 3
 50 INPUT "String ", string$(loop%)
 60 NEXT loop%
 70 PRINT "You input:-"
 80 FOR loop% = 1 TO 3
 90 PRINT string$(loop%)
100 NEXT loop%
```

If you try it you'll see that you can use INPUT with subscripted variables as well as PRINT.

In fact you can use subscripted variables exactly as you've used the other variables you've become accustomed to.

You can even have numeric and integer subscripted variables – just omit the $ in the first case and exchange the $ for a % in the latter.

It's strictly analogous to the way we normally use variables.

Change lines 80 to 100 to the following:

```
 80 FOR counter% = 1 TO 3
 90 PRINT string$(counter%)
100 NEXT counter%
```

All that you've done is to replace *loop%* with *counter%*. This sometimes confuses beginners. Although both *loop%* and *counter%* go from 1 to 3, sometimes beginners forget that *string$(loop%)* and *string$(counter%)* both refer to the SAME STRING when both *counter%* and *loop%* have the same value.

That is:

string$(loop%)
string$(counter%)
string$(1)

all label the same string when *counter%* and *loop%* are 1.

In the altered Program IV it doesn't matter that you input the *string$( )* with *loop%*, you can still refer to them with a different variable within the brackets – it's the VALUE of that variable that counts.

> **❛ If you want to use subscripted variables you'll have to DIM them first ❜**

We call the set of subscripted variables with the same name an array. And we call the number of variables in that set, the number of elements in the array. Also, the correct way to say "DIM an array" is "dimension an array".

So far I've only used the numbers 1 to 3 to reference my variables. You might think that this array has three elements – but it has four. DIMming *string$(3)* actually gives you four elements:

string$(0)
string$(1)
string$(2)
string$(3)

So far I haven't used *string$(0)*, but I'm sure you can rewrite the program to prove it exists. (Hint – change the loop parameters.)

You don't have to stick with four element arrays. Try altering line 30 to give you more elements – again you'll need to change the parameters of your loops to take account of the new parameters.

Leave line 30 as it is so that you are only dimensioning up to *string$(3)* but alter line 40 so that the loop asks for *string$(4)*, that is change it to:

```
40 FOR loop% = 1 TO 4
```

You'll get a "Subscript" error as the array you have dimensioned doesn't have the element you have asked for. Notice that this only happens when the loop asks for *string$(4)* – it copes with the earlier elements in the array.

In Program V we actually input the number of variables we want in an array at the beginning of the program and then dimension the array (lines 30 and 40).

Also notice the way I use the PRINT statement in line 60 to label the INPUT in line 70.

I do it this way round so that each time through the loop I know what number string I'm inputting. You can't directly label an INPUT with a label that changes each time through the loop.

If you don't follow that, run the program and compare how it prompts for inputs. In Program IV it simply asks for "String?" each time, in Program V it asks for "String 1?", followed by "String 2" and so on.

```
 10 REM PROGRAM V
 20 MODE 6
 30 INPUT"How many string$ ",number%
 40 DIM string$(number%)
 50 FOR loop% = 1 TO number%
 60 PRINT "String number ";loop%;
 70 INPUT string$(loop%)
 80 NEXT loop%
 90 PRINT "You input:-"
100 FOR loop% = 1 TO number%
110 PRINT string$(loop%)
120 NEXT loop%
```

That's enough for one go. There's still lots to learn about arrays, or subscripted variables, though. We'll look at them next month, and at procedures – I promise!

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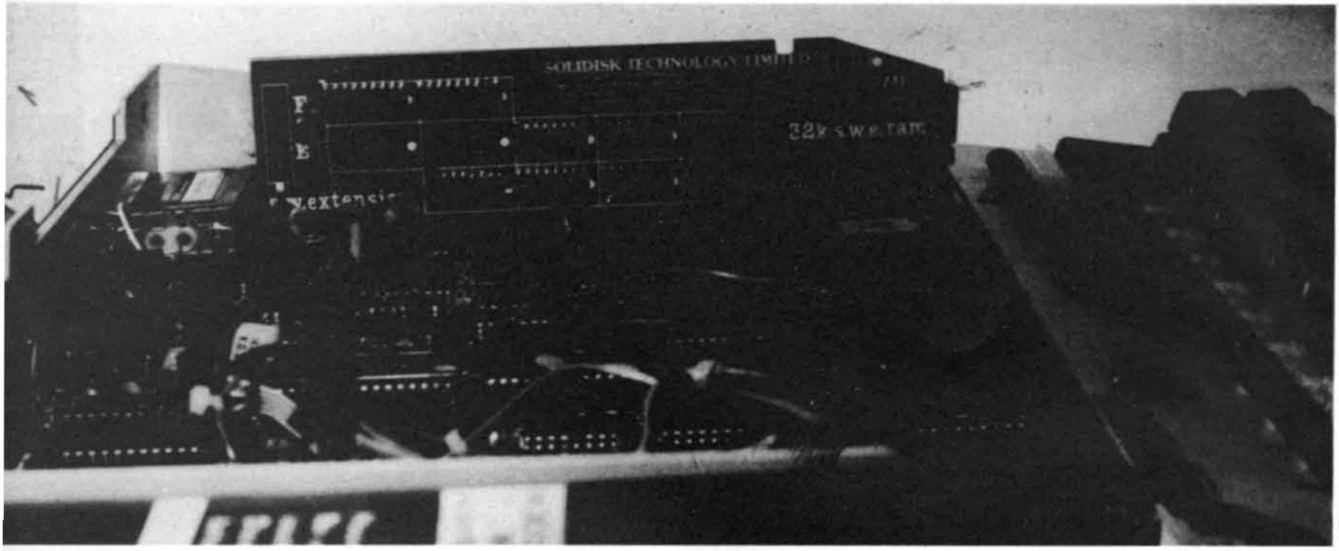


SOLIDISK SIDEWAYS RAM

Solidisk Sideways RAM is the most exciting add-on that many have been waiting for Acorn to produce! Sideways RAM systems have been described in detail in ECM, Acorn User, BBC Micro User etc., and become de facto the way to upgrade the BBC computer. Solidisk Sideways RAM is the first, most popular and most powerful implementation on the BBC computer.

Don't be deceived by salesman's gimmicky talk such as 'the Model C', the '52 k BBC computer' or 'the more you pay, the more you get'. Ask questions and find out the facts and figures.

Compare products — and then decide.

HOW EASY TO INSTALL?

Installing the Sideways RAM on your BBC micro is quite straightforward: push the base unit into the rightmost sideways socket, plug in the control wire terminals and the sideways RAM board into the base unit (see pictures). Insert the utility disc and press the SHIFT-BREAK keys . . .

HOW ABOUT COMPATIBILITY?

The Sideways RAM is completely compatible with all issues of BBC computers, disks, all sideways ROMs, the tube and second processors. Torch disk pack, Teletext, Econet etc. but NOT with ROM extension boards, since it can replace them.

Its power consumption is so low that you can use it in conjunction with twin disks.

HOW DOES IT WORK?

Occupying the same place as sideways ROMs (such as BASIC, WORDWISE, DISC DOCTOR), it is treated like other Sideways ROMs and therefore can replace them. It is ideal for developing ROM-able application programs and eventually it enables ROM based software to be sold unchanged on tape, disk or by electronic mail.

Unlike the Aries B20 board, the Machine Operating System communicates with Sideways RAMs as naturally as with Basic, without complicated procedures such as unknown * FX calls or the need adhere to new programming rules. With Sideways RAM, you can SAVE, LOAD and RUN. You can also write programs in ANY language, using any filing system.

HOW ABOUT SOFTWARE?

Solidisk Sideways RAMs have a much larger range of uses than any other system and the software support is free. Take a look on some of the programs supplied:

MULTITASKING DISK FILING SYSTEM.

By adding extra facilities to the present Acorn's DFS, it is now possible to run more than one program at a time. Furthermore, we are aiming at beating Sinclair's QDOS in the near future.

RAM FILING SYSTEM:

Strikingly similar to disk filing systems but can be used with tape, programs and data can be directly put in ROM form thus enabling stand alone applications to be implemented economically. The ROMs made with STL-RFS is also Electron compatible. (See EPROM products for more details)

PRINTER SPOOLER:

Printer output can also be directed to Sideways RAM and printing will carry on in the background while your computer is busy processing.

RAM-DISC:

The Solidisk is a RAM disc in your system. It works EXACTLY like an extra disc drive but a lot faster as it has no inertia. Capable of loading or saving at 40,000 bytes a second, it is responsible for the outstanding performance of SILEXICON and WORD64 (see opposite page).

The Solidisk resides entirely in Sideways RAM and does not use any bytes of the normal RAM.

The Solidisk is a marvellous productivity tool in every application field: compilers, data base, 3D graphic, Wordprocessing, Engineering, CAD, Music and speech synthesis etc.

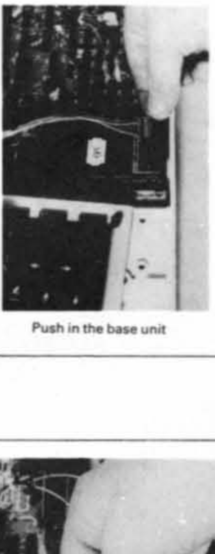
HOW ABOUT THE FUTURE?

Also unlike other makes (SIR, APTL, WE Sideways ROM/RAM extension boards and the Aries B20), Solidisk Sideways RAM is expandable from 16k right to 128 k and to 256k in July. It is a fraction of their cost thanks to Texas Instruments and INMOS advanced VLSI technologies.

That awesome power is the reason why you should handle it with care.

Solidisk sideways RAM has created a rapidly growing user group and we are working flat out to step up production for the dealers.

HOW EASY TO INSTALL:



Push in the base unit

Connect the control wires

WHICH SIDEWAYS RAM DO YOU NEED?

Solidisk Sideways RAM is available in 16k (SWR16), equivalent to 1 sideways ROM, 32k (SWR32), equivalent to 2 sideways ROMs or 128k (Solidisk), equivalent to 8 sideways ROMs. You can buy a small Sideways RAM now and upgrade it later. From the SWR16 to the SWR32 is by straight exchange, from the SWR32 to the Solidisk is by adding the Solidisk Extension which holds 96K of memory on just 3 square inches!

FREE SOLIDISK SOFTWARE SOFTWARE SUPPORT SERVICE:
IN WORDPROCESSING:
WORD 64:
Using the Solidisk as working space for WORDWISE, WORD64 offers up to 64K free characters for any text.
Using WORD64, you can write much larger programs than BASIC normally handles!

IN SPELLING CHECKER:
SILEXICON:
SILEXICON scans texts at more than a 1,000 words a minute and comparing each word against the dictionary, Silexicon marks the mis-spelt words for either addition to the dictionary or eventual correction.
A disk based program would make a lot of noise accessing the dictionary, SILEXICON takes advantage of the non inertia of Sideways RAM and runs quietly at more than 20 times the speed. Silexicon works with the Solidisk or a second disk drive.

IN DISK FILING SYSTEM:
STL150: this utility program enhances Acorn DFS.90 by moving disk working space into sideways RAM leaving PAGE at &EOO and adding extra disk commands. With STL150, you can format 40/80 track dikettes, verify and have up to 150 directory entries per side. Many DFSs have similar features (such as WATFORD DFS) but none has as much as STL150.

IN PORTABLE APPLICATIONS:
SOLIDISK RFS
Solidisk RFS (RAM/ROM filing system) is an innovation. Save and load your program, open a file for BPUT, BGET directly in Sideways RAM at 60,000 bytes a second. More: the STL RFS has a Sideways ROM format, it can be copied onto EPROM to give instant recall of your programs. Plug this EPROM into any sideways socket, type *RFS and it runs itself. Imagine the profit in selling your program in EPROM!. Compatible with the ELECTRON and BBC, tape and disks, SWR16, SWR32 and Solidisk.

IN SYSTEM MANAGEMENT:
THE MENU PROGRAM
This program puts all computer's resources at your fingertips helps to set up your firmware, disks etc by simple menu options.

MORE FREE SIDEWAYS RAM SOFTWARE TO COME:
While others are making promises for software to be written, Solidisk Sideways RAM comes with a complete, novel and powerful software package including compatibility with existing sideways software. Right now, the STL RFS has the same effect on the BBC computer that the DFS had 2 years ago — that means masses of low cost software on the line!
Each Sideways RAM is accompanied by the Sideways RAM User Manual, full 1 year warranty, a utility disc containing 100k of programs and free mailing on all new publications from the Software Support Service.
Available soon: the Source Code and Technical Manual (3 floppies and a 300+ page book) price = £10, the SILEXICON EXTENSION PACKAGE (3 floppies and a 40 page manual, 30,000 word dictionary: English and French now, German and Spanish planned) price = £9.00. '4S' also publishes regular updated SWR utility discs at £3.00. Every user can do contract work for the SUPPORT SERVICE and make a lot of money for him/herself!
In other words, the Solidisk Sideways RAM is not only a wide choise now by saving you money but also a long term INVESTMENT.

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You can also purchase a growing range of add-ons designed to be used in the same base unit such as EPROM programmer now, Teletext receiver and 8088 second processor later. We also product disk systems based on the TEAC FD55 series. A detachable keyboard case and portable CPU case for the BBC computer is well under way for delivery in JUNE.
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To order the Sideways RAM is simple: complete the coupon below. Access and Barclay card holders can place their order by phone on Southend (0702) 334766/334777.
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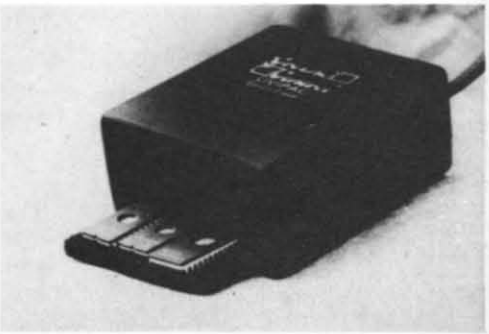

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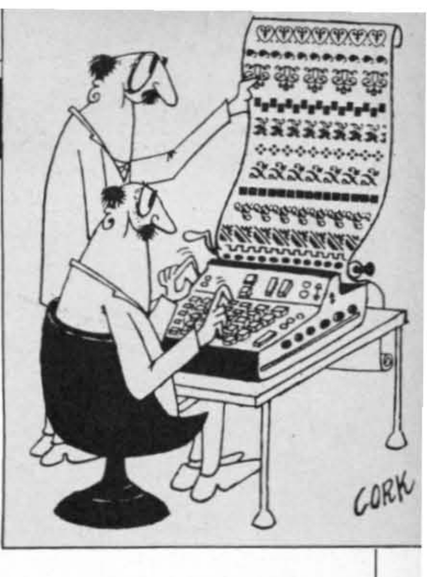


By ERIC H. CRISP

LAST month we looked at how several programs could be stored in memory at once and run successfully sharing common variables.

It is possible to use procedures and subroutines at different page values and share these between several programs. However care needs to be exercised to ensure success.

It is largely a question of getting the Basic pointers to match the programs you are using, as we showed last month.

Try the following subroutine example by typing in PROGI at PAGE = &2000.

```
PAGE = &2000
NEW
```

sets PAGE

```
10 REM PROG I
20 ?&12 = &34 : ?&13 = &22
30 LOMEM = &2234
40 A$ = "PROG I"
50 PAGE = &2200
60 PRINT A$
70 GOSUB 10
80 PRINT A$
90 GOSUB 10
100 PRINT A$
110 PRINT "END OF PROG I"
120 END
```

and the subroutine SUB I at PAGE &2200 as follows:

```
PAGE = &2200
NEW
```

to set a new page.

```
10 REM SUB I
20 PRINT "SUB I"
30 A$ = A$ + "X"
40 RETURN
```

Lines 20 and 30 of PROG I is set TOP and LOMEM to the value of TOP for SUB I as described last month.

To check that LOMEM and TOP really are &2234 for SUB I, just set:

```
PAGE = &2200
OLD
PRINT ~TOP
```

If this value differs slightly from &2234 it is due to extra or fewer spaces in your listing of SUB I. Change lines 20 and 30 to match your value of TOP for SUB I.

Remember, to get PROG I back to alter it, type:

```
PAGE = &2000
OLD
LIST
```

It may be an idea at this point to save PROG I and SUB I as described last month, in case of accidents.

If you run PROG I by:

```
PAGE = &2000
OLD
RUN
```

you should get this on the screen:

```
PROG I
SUB I
PROG IX
SUB I
PROG IXX
END OF PROG I
```

If a syntax error and bad program error resulted instead, it is probably because TOP and LOMEM were not set to their correct values.

If you saved the programs as suggested, load them back in again like this:

```
PAGE = &2000
LOAD "PROGI"
PAGE = &2200
LOAD "SUBI"
```

Check the value of TOP for SUB I and correct lines 20 and 30 in PROG I.

If the program worked as indicated, the order of execution of the program should be clear. But how it did it may not be so plain, especially as LIST gives SUB I when it is obvious that the last instruction executed was from PROG I.

SUB I is listed because PAGE is still matched to the start of SUB I.

So how did execution of the program return back to PROG I when the PAGE value was set to SUB I?

The answer lies in the way GOSUBs and RETURNs are handled.

When the Basic interpreter encounters a GOSUB statement it saves the memory address of the instruction following the GOSUB statement. It then searches for the line number specified by the GOSUB statement, starting at PAGE.

When the line is found, it executes the program from that point until it encounters a RETURN. Then it recalls the saved memory address of the instruction following the GOSUB and continues execution from there.

In our example the GOSUB looked for line 10 starting at PAGE – which has been changed to &2200 – so executing SUB I.

When it encountered the RETURN instruction it simply went back to executing PROG I from where it left it regardless of the value of PAGE.

You may think that things will go

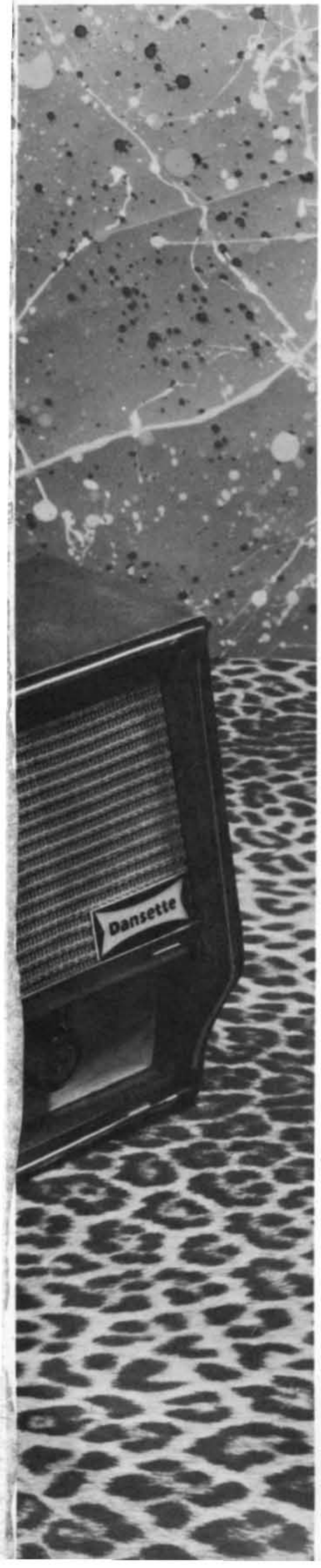
Turn to Page 53

Amazing how played out some things

PARLOPHONE

become.

Will you think the same of your micro in 6 months' time?



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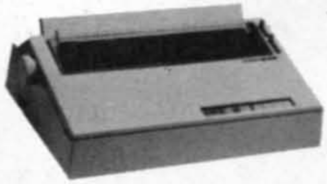

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From Page 49

wrong when programs are executed with PAGE and TOP values that do not match the program, as indicated last month.

But PAGE is only needed when the order of execution of a program is to be changed by a GOTO, GOSUB, PROC or RUN.

TOP only seems to be used for setting LOMEM when RUN is executed and for checking that a MODE change will not wipe out part of the program. More about MODE changes later.

As long as TOP is set to the highest program or routine in memory, everything should run smoothly.

Procedures can be used in a similar way to subroutines. Change the following lines of PROG I as follows:

```
PAGE = &2000
OLD
```

to set PAGE.

```
10 REM PROG IA
20 ?&12 = &3E : ?&13 = &22
30 LOMEM = &223E
70 PROCA
90 PROCA
110 PRINT "END OF PROG IA"
```

and change SUB1 as follows:

```
PAGE=&2200
OLD
```

to set PAGE, then:

```
10 REM PROC A
15 DEFPROCA
20 PRINT "PROC A"
40 ENDPROC
```

Again check that TOP and LOMEM set in PROG IA match TOP for program PROC A, and save these programs as PROGIA and PROCA.

Running PROG IA by:

```
PAGE = &2000
OLD
RUN
```

should give a very similar result to the subroutine version earlier. This shows that procedures are handled in a similar way to subroutines.

You may be thinking at this point, "Oh very clever, but what use is it?" Well, two programs can share the same procedure or subroutine using this method by putting the subroutine on its own at a particular PAGE value.

For instance, type in PROG IIA at PAGE &1E00 keeping PROG IA and PROC A at &2000 and &2200 respectively:

```
PAGE = &1E00
NEW
```

to set PAGE.

```
10 REM PROG IIA
20 ?&12 = &3E : ?&13 = &22
30 LOMEM = &223E
40 A$ = "PROG IIA"
50 PAGE = &2200
60 PRINT A$
70 PROCA
80 PRINT A$
90 PROCA
100 PRINT A$
110 PRINT "END OF PROG IIA"
120 END
```

Again save this as PROG IIA for later. Now run PROG IA, then PROG IIA:

```
PAGE = &2000
OLD
RUN
PAGE = &1E00
OLD
RUN
```

You should find that both programs work using a common procedure.

This method is of real advantage when programs are large. For example, if a suite of programs use common routines, the routines could be loaded first, followed by the first program which is then run.

The second program is then loaded into the space previously occupied by the first program and run using the same routines as the first program without having to load them in again.

Normally the second program would need to have the routines within it, making the program longer, and therefore occupying valuable disc space or taking ages to load if on tape.

The way this is done can now be demonstrated providing you have saved PROG IA, PROG IIA and PROCA.

First switch off the computer to ensure the memory is clear of all programs. Switch on again and load in PROCA by:

```
PAGE = &2200
LOAD "PROCA"
```

Now load and run PROG IA as follows at a convenient PAGE value below PROCA, say &1B00:

```
PAGE = &1B00
CHAIN "PROGIA"
```

When this has finished, load and run PROG IIA:

```
PAGE = &1B00
CHAIN "PROG IIA"
```

You should find that each program has successfully run using the same procedure as before.

This may seem rather simple, but there are a few things to be wary of.

The main thing is that PAGE has been changed, so that calling a procedure or subroutine or using a GOTO will cause Basic to look for it outside the main program.

If the procedure, subroutine or line number is in the main program then the value of PAGE must be reset to match the main program again.

If not, an error indicating that the program could not find it may result, such as "no such FN/PROC".

Another thing to bear in mind is that if you call a procedure by, say, PROCA with PAGE at the value for your main program, it will find procedure A that is defined in the main program.

If PAGE is set to a value to match a group of routines and procedures elsewhere in memory, and PROCA is executed it will look for – and hopefully find – it from this different PAGE value, and not from within the main program, even though there is a DEFPROCA in the main program. This leads to another use of this method.

With subroutines there exists a useful instruction ON N% GOSUB 400, 500, 600 and so on, but for procedures there is no equivalent instruction.

Procedures are preferable to subroutines in several respects, such as the ability to pass parameters, so it would be nice to have an ON N% PROCA, PROCB, PROCC facility.

Well, storing procedures at different page values enables an effective ON

From Page 53

N% PROCA, etc, to be performed.

As an example, make sure that PROCA is at page &2200, put PROC A2 and PROC A3 at PAGE &2400 and &2600 like this:

```
PAGE = &2400
NEW
```

to set PAGE.

```
10 REM PROC A2
15 DEFPROCA
20 PRINT "PROC A2"
30 A$ = A$ + "Y"
40 ENDPROC
```

and then:

```
PAGE = &2600
NEW
```

to reset PAGE.

```
10 REM PROC A3
15 DEFPROCA
20 PRINT "PROC A3"
30 A$ = A$ + "Z"
40 ENDPROC
```

You will need to know the value of TOP for the highest procedure in memory, so do:

```
PAGE = &2600
OLD
PRINT ~TOP
```

It should be about &2640.

Now do the following to get PROG IA at &2000:

```
PAGE = &2000
LOAD "PROGIA"
LIST
```

Next, change lines 20 and 30 in PROG IA to match the value of TOP for PROC A3:

```
45 INPUT N%
50 PAGE = &2000 + N% * &200
120 PAGE = &2000
130 GOTO 10
```

Now run and input either 1, 2 or 3 when the ? prompt appears. You should get the relevant PROC A called at each stage.

Note that PAGE had to be put back to &2000 for the GOTO 10 to actually go to line 10 of the main program rather than one of the PROC As.

Having got round one shortcoming of procedures, there is another annoying problem which can be solved. This is the inability to change mode in them as you can in subroutines.

The following shows this point:

```
10 REM MODE I
20 PROCB
30 PRINT "END"
40 END
100 DEFPROCB
110 MODE2
120 ENDPROC
```

When run it results in a "Bad MODE" error.

The main reason Basic will not allow you to change mode in a procedure is because MODE sets HIMEM, and it is this it objects to.

In program MODE I change line 110 to:

```
110 HIMEM = &3000
```

Run it now and you may get an unspecified error or worse still, a string of OSCLIOSCLIOSCLI . . .

For some reason, Basic does not check for HIMEM in a procedure despite its inability to handle it. Resetting HIMEM to its present value has the same effect.

The reason for it not working properly in a procedure is that the return addresses for procedures mentioned earlier are stored immediately below HIMEM, and resetting HIMEM causes Basic to lose them.

So when it happens in a procedure, Basic cannot find its way back to the main program properly.

You can actually see the return address being stored by putting HIMEM into the middle of screen memory.

```
10 REM MODE II
20 MODE 2
30 HIMEM = &7C00
40 PRINT "PRESS SPACE"
50 REPEAT UNTIL INKEY(-99)
60 PROCB
70 PRINT "END"
80 END
100 DEFPROCB
110 PRINT "PRESS RETURN"
120 REPEAT UNTIL INKEY(-74)
130 ENDPROC
```

When run HIMEM is in screen memory so that when space is pressed, PROCB is called and the return address is put below HIMEM.

This can be seen by the coloured dots that appear near the bottom of the screen. When ENDPROC is encountered it reads the return address from here.

If the following is inserted:

```
115 HIMEM = &7C00
```

this will not change HIMEM when run, and the return addresses are still to be seen on the screen, but it does not work.

If the program is now changed like this:

```
115 CLS
116 PRINT "PRESS SPACE AGAIN"
117 REPEAT UNTIL INKEY(-99)
```

the return address is wiped out by the CLS and the computer gets completely lost and crashes. Remove line 115 and all is well.

Back to changing mode in a procedure. MODE can be changed by using VDU 22,M where M is the value 0 to 7 for modes 0 to 7. This enables MODE changes without the usual checks and initialisations.

Hence HIMEM is unchanged, and so VDU 22,M will work inside a procedure. However the absence of checks means that the procedure return addresses, variables and even the end of the program can be wiped out by this statement.

To ensure that none of this occurs, always make sure that HIMEM is set at the start of the program to the value it requires for the highest resolution mode used, for example &3000 for modes 0, 1 and 2, &6000 for mode 6. If all mode changes are then done by VDU 22, M then HIMEM will remain unchanged.

One thing I discovered in the process of writing this article is that the return addresses of procedures and subroutines are independent of each other.

This leads to the possibility of returning from a subroutine from within a procedure:

```
10 GOSUB100
20 PRINT"STILL IN THE PROCEDURE"
30 ENDPROC
100 PROCX
110 PRINT"END"
120 END
200 DEFPROCX
210 RETURN
```

Can anyone think of a use for this?

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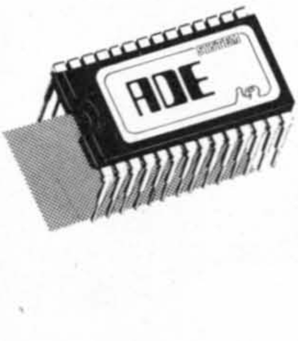

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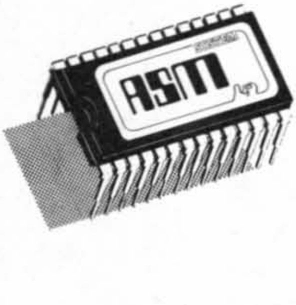

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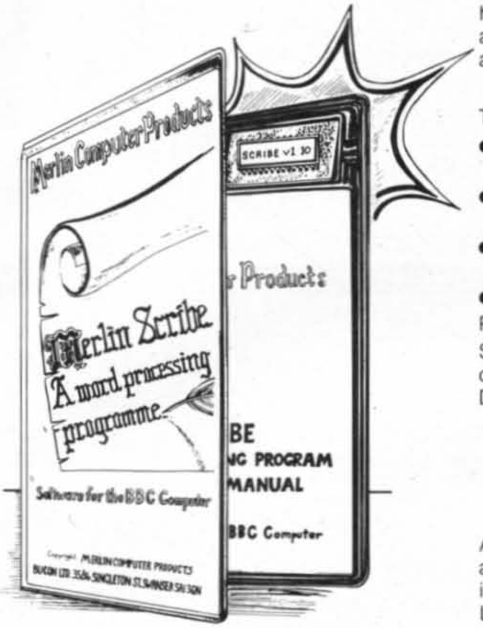

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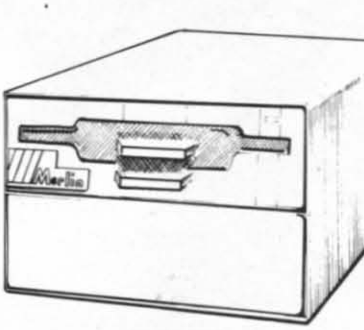

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f0
f1
f2
f3
f4
f5
f6
f7
f8
f9

Re-discover those disappearing key definitions

This machine code utility program by SIMON HUGHES allows you to display a definition string quickly and easily.

IT'S such a time saver when mistakes can be corrected with the cursor and copy keys. However the source text needs to be on the screen.

For a key definition that has disappeared off the screen, the only solution is to redisplay the definition string.

The following machine code program displays all the keys that are currently defined. They are laid out so that each is an exact replica of the original definition, and so editing them becomes easy.

Armed with my second bible, the Advanced User Guide, I found the key strings are stored in a soft key buffer from &B11 to &BFF. Because each string is of variable length, it is indexed by a table starting at &B00.

The table has 17 bytes, one for each key, with one more to show an end address. Each byte holds offsets from &B01 to the start of a string.

The address of the first character of nth key string is &B01 + ?(&B00+n).

This agreed with the User Guide, but I found the last character could not be found by the equation on Page 281.

It seems that the address of the last character is not necessarily one less than the start of the 'next' key string. This is because the strings are stored in the buffer in the order that they are defined. The 'next' key string (by key number) does not always follow the previous one.

The way to find the end point of a string is to scan all the starting offsets for the rest of the keys until the next highest offset is found. Then all characters between the start address and the next highest start address minus one belong to a single string.

The program is well documented, and the code occupies space in the RS423 buffer. For those that use this, put the code somewhere else that's safe. The routine is called by the command *CODE without any parameters.

To make it suitable for inclusion in a sideways ROM no memory is needed apart from the stack.

This might produce slower code than normal, but there is no headache about where to put the odd byte so other routines don't interfere.

The program can be tested as in Figure I. It indicates that all the control sequences are handled correctly.

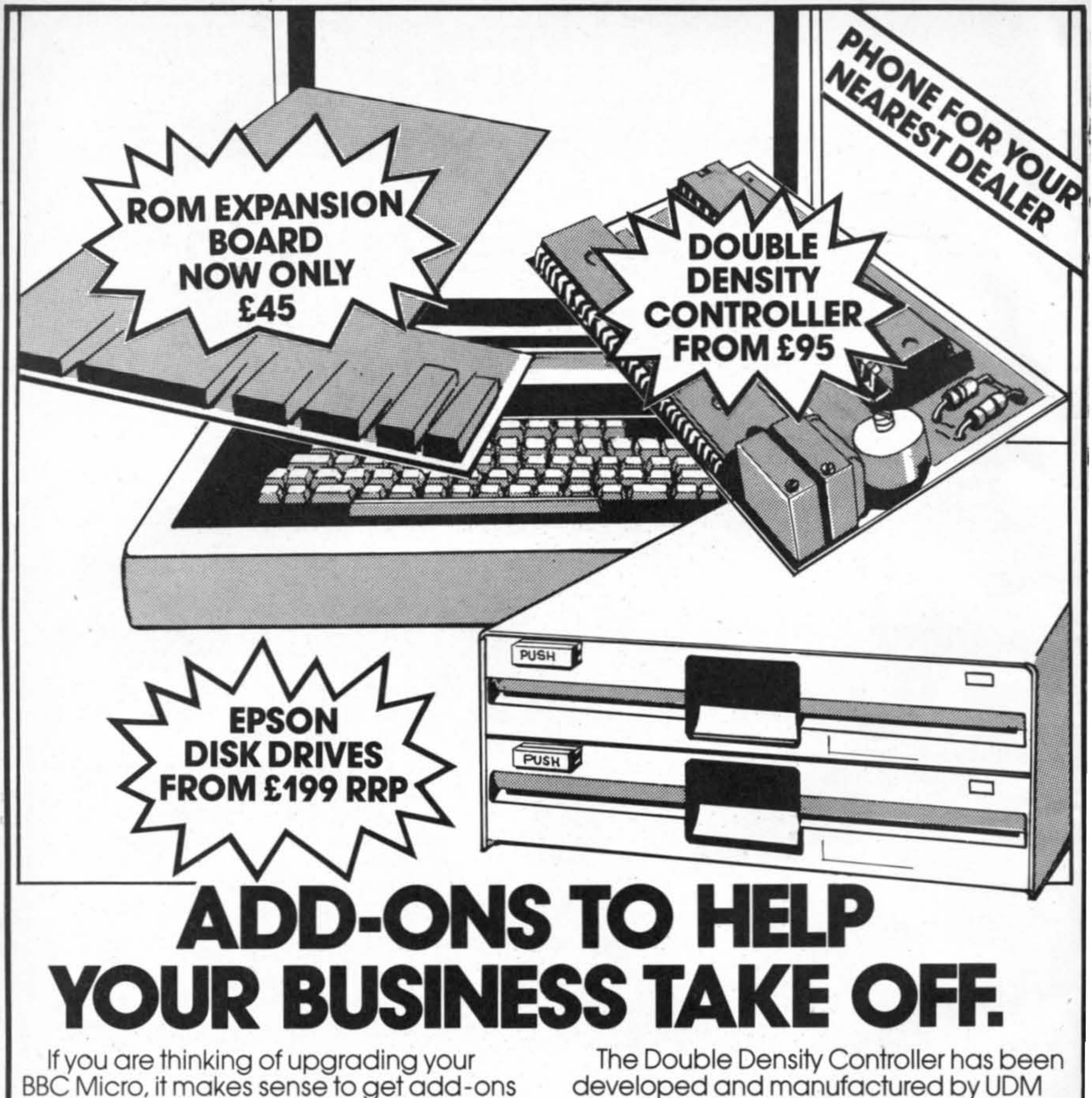
For instance if the character has an Ascii value less than 32 then it is preceded by a vertical bar character.

For codes greater than 127 the character is prefixed with the vertical bar and an exclamation mark. The character code is then reduced by 128 before being displayed.

```
RUN ————————————————→ Run Listing I
>*CODE —————————————→ Call code – no keys should be defined
>*FX4,1
>*KEY3 |!|L             }
>*KEY15 "HELLO"         } Enter keys
>*KEY 7 |!|DLIST|M      }
>
>*CODE —————————————→ Call code
 *KEY3 |!|L             }
 *KEY7 |!|DLIST|M       } Keys correctly listed.
 *KEY15 HELLO           }
>
```

Figure I: Testing the function key editor

```
 100 REM *** FUNCTION KEY DISPLAY
      ***
 200 REM *** By S.Hughes
 300 REM *** For THE MICRO USER
 400 MC%=&A00
     :REM SOMEWHERE SAFE!?
 500 oswrch=&FFEE
     :osnewl=&FFE7
 600 FOR O%=0 TO 2 STEP 2
 700 P%=MC%
 800 [OPT O%
 900 .enter CMP#0 ;is it *CODE
1000 BEQkeys ;yes so enter
1100 RTS ;finish
1200 .keys LDY#0 ;first key No.
1300 .keyloop LDX&B00,Y ;get start-1
1400 INX ;now start
1500 TYA ;A=key No.
1600 PHA ;save key
1700 TXA ;A=start
1800 PHA ;save start
1900 .loop1 LDY#16 ;top key+1
2000 TXA ;A=possible
2100 \ ;address of
2200 \ ;next string
2300 .loop2 CMP &B00,Y ;next start?
2400 BEQ gotend ;know length
2500 DEY ;try next key
2600 BPL loop2 ;if some left
2700 INX ;else search
2800 \ ;for a higher
2900 \ ;address
```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Function Key Display listing

From Page 59

```
3000 CPX&B11 ;seen all
3100 BNE loop1 ;if not
3200 \ ;key is empty
3300 PLA ;forget start
3400 JMP next ;another key
3500 \ ;key exists
3600 \ ;X=end
3700 .gotend LDY#5 ;5 chars
3800 .stloop LDAstr-1,Y ;to print
3900 JSR oswrch ;output
4000 DEY ;next char
4100 BNE stloop ;more to do
4200 PLA ;get start
4300 TAY ;Y=start
4400 .down DEX ;reduce end
4500 DEY ;reduce start
4600 BNE down ;until 0
4700 TAY ;Y=start
4800 \ ;X=length-1
4900 PLA ;get key No.
5000 PHA ;and save
5100 CMP#10 ;two digits?
5200 BCC one ;just one
5300 LDA#ASC ("1");for output
5400 JSR oswrch ;print it
5500 PLA ;get key No.
5600 PHA ;and save
5700 SEC ;subtract
5800 SBC#10 ;less ten
5900 .one OR A#&30 ;now ASC II
6000 JSR oswrch ;print it
6100 LDA#ASC (" ");space char
6200 JSR oswrch ;print it
6300 .getchar LDA &B00,Y ;get a
      char
6400 BPL pos ;not >127
6500 PHA ;save char
6600 JSR codech ;print ¦
6700 LDA#ASC ("!");print !
6800 JSR oswrch ;print it
6900 PLA ;get char
7000 AND #&7F ;subtract 128
7100 .pos CMP#32 ;is it a code
7200 BCS notcode;branch if no
7300 PHA ;save char
7400 JSR codech ;print ¦
7500 PLA ;get char
7600 OR A#&40 ;add 64
7700 .notcode JSR oswrch ;print
      it
7800 INY ;move on char
7900 DEX ;next char
8000 BPL getchar;if more
8100 JSR osnewl ;LF CR
8200 .next PLA ;get key No.
8300 TAY ;Y=No.
8400 INY ;next key
8500 CPY#16 ;all done?
8600 BNE keyloop;no so branch
8700 RTS ;else done
8800 .codech LDA#ASC ("¦");code
      char
8900 JMP oswrch ;and RTS
9000 .str
9010 ]
9020 $P%="YEK# "
9100 P%=P%+LEN "YEK#  "
9200 NEXT
9300 ?&200=enter MOD 256
9400 ?&201=enter DIV 256
```

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"MANAGER OF THE MONTH"

COMPETITION

We guess that most of our users are, like ourselves, disappointed that they won't be watching any of the home countries' teams in the European Nations' Cup. So, to take us through the summer, we are running our own "MANAGER OF THE MONTH" competition for June, July and August. That's 3 prizes of £100 each for the best managerial performance to be submitted to us during those months. The rules are very simple. We believe that the recently announced REV.1 of the program is an accurate measure of your ability as a soccer manager. We are looking for the best 5 season performance (one game) to be played in that month. You submit your best game, played at any level, on the official entry form supplied with all copies of "League Division One REV.1". A full description of the rules appear on that form; they merely ensure no "cheating", that you are a genuine owner of the program, and that no-one connected with QUAL-SOFT takes part. You can submit only one entry each month, but can enter in each of the 3 months (except for the winner).

Current owners of the game will understand the competition, but for newcomers here is a brief account of the game. The program realistically simulates the problems of the manager of a club newly promoted to the 1st Division of the Football League. You have a squad of 18 players and a further 12 players available on the transfer market. Your job is to build up a squad which, over the next 5 seasons, will challenge for the 1st Division Championship. The game will test your knowledge of the real game of soccer to the full, and your ability to use that knowledge intelligently. This doesn't mean that you have to be a genius to play well, our best performance to date (that we know of) has been from a 13 year old, but you do need to think hard about your tactics and strategy.

For a more detailed description look back over the last 6 issues of The Micro User.

A WORD ON MAIL ORDER. Many people are, justifiably, concerned about mail order. Delivery can be bad, even non-existent; no-one to contact in the case of problems, letters go unanswered; worst of all the programs are often amateurish or just plain "junk". Right? Doubtless you have other complaints.

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BACKUP/DISC: We not only allow backup we ADVISE you backup your tape immediately. Transfer to disc is straight forward. We recommend Mike Bibby's advice, page 133 May issue of The Micro User.

REPLACEMENT: Tapes deteriorate with time, and are sometimes accidentally damaged. We will replace such tapes at a VOLUNTARY cost of 50 pence. On upgrades, see bottom left of our coupon.

PROGRAM QUALITY: LD1 uses 28.5k of memory despite using the efficient Mode 7, with a 20 page manual/booklet and a 12 page REV1 supplement. It is written by a professional ANALYST/programmer which allows Mr. A. Ashton of Luton to write, "..... I think the boffins involved deserve a pat on the back, not only for an excellent program but for their understanding of the game and its problems."

* Current Owners. As promised, return your original cassette and case with just £1 to cover p&p, re-recording of LD1 REV1 and the new REV1 supplement. (Keep your present 20 page LD1 booklet.)

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B7

Let your discs do the talking

By JOHN RODGERS

I DO not suppose I am alone in getting my discs in a mess. I don't mean with coffee or cigarette ash, but an organisational mess.

There are different versions of my brainchildren on different discs, twins but not identical twins you might say.

Then there are all those programs with names like ZCOM and WHOOPS and T.EXP whose function I have totally forgotten.

Even though I do remember that EXP means "experimental" it's not very enlightening, as all my programming is.

Now you might be unkind enough to suggest that nothing much would be lost if my discs were immersed in coffee, but that honestly wouldn't be right.

If only I knew which disc they were on I could show you an interesting little PROC here and a fascinating bit of assembly code there.

So it was time to take myself in hand and make my programs tell me all about themselves. As soon as a program was run I wanted to be shown all the facts about it and to have the option for the RUN to continue or to END.

It's a very simple idea, but it has made me and my discs very happy. I'll describe my convention and if you want to do something of the kind it will be easy to modify to your own taste.

In the program lines that follow the numbers in brackets represent the hidden colour codes obtained with Shift/ f key as explained in Jim Notman's "Typing in listings" article in the May 1984 issue of *The Micro User.*

```
1 MODE 7
  :PRINT "<131>3   <134>19 6 84
     <135>12 <132>112   <130>54"
```

This gives, in the different colours, the program version number, the date the program was amended and saved, the disc number, the back-up disc number and the program number.

Next comes a line for references or acknowledgments:

```
2 PRINT "(C)MICRO USER June 84
   p88"
```

Then comes a line, or sometimes several lines, describing the program:

```
3 PRINT "<131>Experiment with
   Mode 7 graphics"
```

The last three lines are always numbered 7, 8 and 9 for reasons which will become clear:

```
7 PRINT "<134>FF1900 FF801F 00641
   01B"
8 PRINT "<133>             ""EXS67"
  ""

9 IF GET <>32END
```

Line 7 contains the load and execution addresses and file length which are given by *INFO PROGNAME.

Line 8 gives the program name, and line 9 is the stop line.

First a dummy program in this form is typed in and spooled. I put all spooled files in Directory S and I call this dummy simply "F" so:

```
*SP. S.F
LIST
*SP.
```

Now when I am ready to add these descriptor lines to a new program it is just necessary to check that the program is numbered from 10 up and then:

```
*EXEC S.F
```

Now when the program is run the multi-coloured description is screened and you have the option of Space to continue the run or any other key to terminate it.

You might think it more natural to put the name of program at the top of the display but there is actually good reason for putting it at the bottom.

First it saves a lot of typing, and secondly it guards against saving programs to unintended names through typing errors (the explanation of not a few of my mystery programs).

Now that we are ready to save the program, RUN, then hit any key except Space. You can now type "SA.", shift the cursor up one line and copy the program name, complete with quotation marks, with the Copy key.

Make sure that on line 8 the hidden colour code comes immediately after the first quotes because if it gets copied into the program name when saving you'll get a Bad filename error.

The 10 extra spaces to the left of the program name are useful to ensure that you can also type longer instructions like:

```
*COPY 0 1 "PROGNAME"
```

without having to move the cursor leftwards to pick up the program name.

There is just one final step, namely to get the correct data for line 7. After saving type:

```
*I.PROGNAME
```

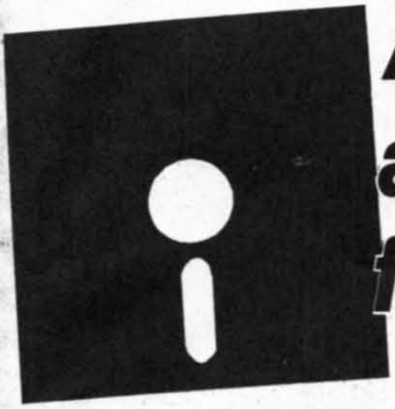
This screens the information. LIST line 7 again and copy the data into the line, not forgetting the quotes at the end, and save again.

When a program is being run repeatedly you may, like me, get too lazy even to hit the space bar each time. Then just eliminate the stop line, 9.

Since adopting this little scheme I've become a regular infanticide. Any of those "P.PLOOPS" that can't justify themselves get a very swift *DEL.

```
1 MODE 7
  :PRINT "<131>3   <134>19 6 84   <135>12 <132>112   <130>54"
2 PRINT "(C)MICRO USER June 84 p88"
3 PRINT "<131>Experiment with Mode 7 graphics'
7 PRINT "<134>FF1900 FF801F 00641 01B"
8 PRINT "<133>             ""EXS67"""
9 IF GET <>32END
```

The full header



A routine to abort those file foul-ups

By MARCUS ADAMS

HOW many times while you've been using discs have you accidentally typed the wrong filename, completely wiped out an important file and *then* thought about making a backup?

If like me you've lost count or have young children, who you can blame for such mistakes, the following utility should be of some use.

Using some of the lesser-used OS calls this routine will give you the option of overwriting old files or aborting the operation because you've made a mistake.

The utility is intended for disc only and will work with all DFSs provided that a suitable position is found for the code. Page 10 or &A00 to &AFF should be suitable for most systems.

The utility checks to see if the filename you specified is already on the disc. If so, it then checks with you to see if it's OK to write over it.

Only if you answer Y or y will the computer write a new file. If not, the message "Aborted" will be displayed.

I should emphasise here that the routine checks for write commands through OSFILE only. It will not issue warnings if commands such as OPENIN (OPENUP on Basic II), OPENOUT and so on are used, as these initialise through the OSFIND vector.

This is how it works:

10-60	Does the general initialising work.
70-200	Revectors the OSFILE vector to point to the start address of the utility, and outputs the "Utility connected" message.
210-250	Tests to see if the user is LOADing or READing catalogue information and jumps out if so.
260-280	Saves the 6502 registers.
290-360	Transfers the address of the filename from the OSFILE parameter block into the index registers X and Y.
370-400	Checks to see if the specified file is already on the disc by trying to open a file for reading. If a channel cannot be opened the file is not on the disc and the routine does a SAVE as normal.
410-450	That file is already on the disc so closes the file and outputs a message to inform the user.
460-590	Gets reply from user to say whether to save or not.
600-640	Tests the user's input and acts accordingly.
650-700	Restores the 6502 registers and jumps back to the original routine.
710-790	Outputs a short text message followed by a beep.
800-870	Forms a Basic error message routine to output the "Aborted" message with error number 43. The error can be trapped as normal and printed with REPORT. The error number is returned in ERR.
880-1080	Used for various workspace and buffers.
1090-1180	Inserts the text messages into the code and prints up the copyright notice.

```
 10 MODE 7
 20 name=&70
 30 osword=&FFF1
    :osfind=&FFCE
 40 FOR N%=0TO 2STEP 2
 50 P%=&A00
 60 [OPTN%
 70 .revec
 80 SEI
 90 LDA &212
100 STA vec
110 LDA &213
120 STA vec+1
130 LDA #START MOD 256
140 STA &212
150 LDA #START DIV 256
160 STA &213
170 CLI
180 LDX #16
190 JSR message
200 RTS
210 .START
220 CMP #5 \read catalogue info
230 BEQ over
240 CMP #255 \load named file
250 BEQ over
260 PHA
270 TXA
    :PHA
280 TYA
    :PHA
290 STX name
300 STY name+1
310 LDY #0
320 LDA (name),Y
330 TAX
340 INY
350 LDA (name),Y
360 TAY
370 LDA #&40
380 JSR osfind
390 CMP #0
400 BEQ pull \file not found
410 TAY
420 LDA #0
430 JSR osfind \close the file
440 LDX #3
450 JSR message
460 LDA #(msg) MOD 256
470 STA block
480 LDA #(msg) DIV 256
```

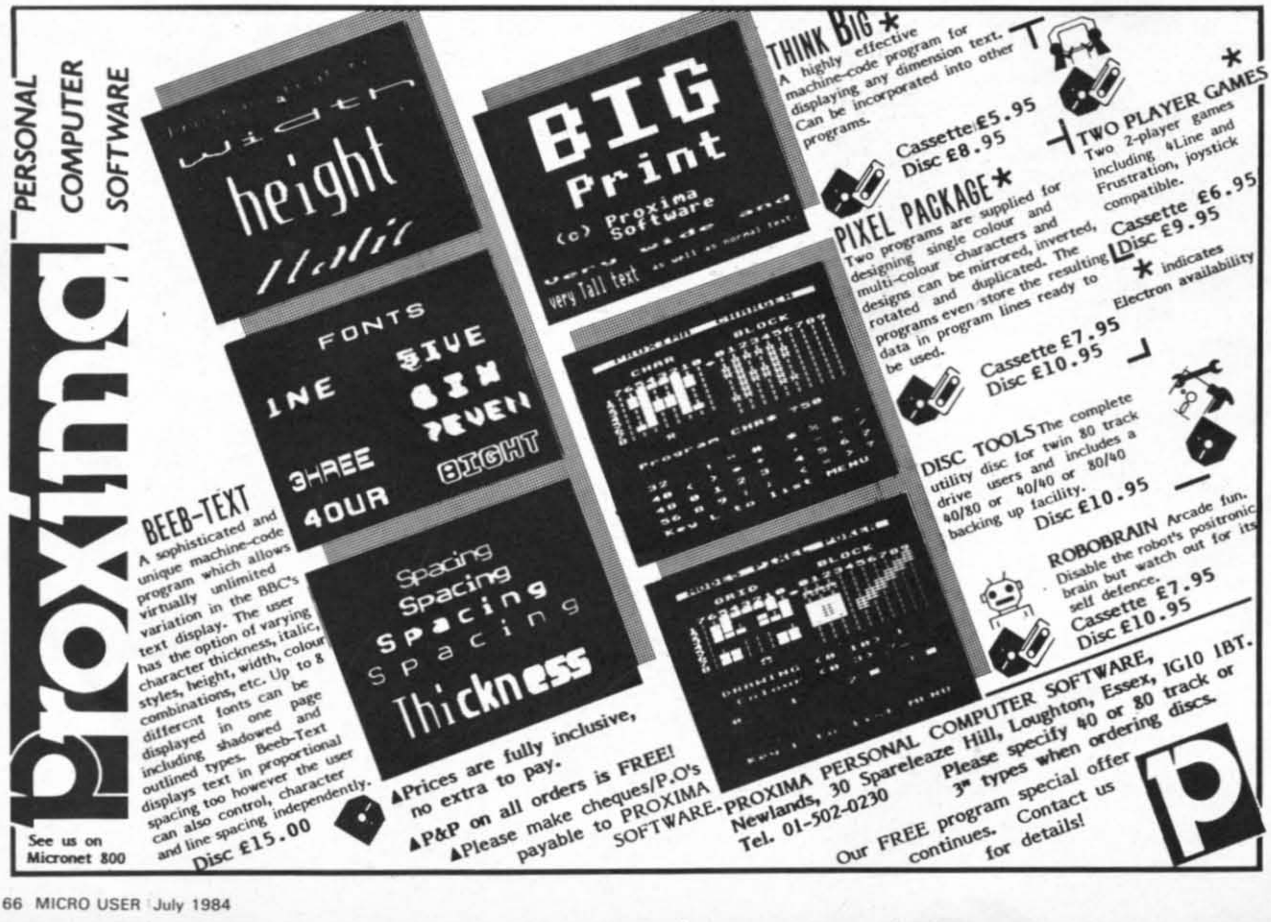
→

Discs without discord

From Page 65

```
490 STA block+1
500 LDA #1
510 STA block+2
520 LDA #33
530 STA block+3
540 LDA #126
550 STA block+4
560 LDX #(block) MOD 256
570 LDY #(block) DIV 256
580 LDA #0
590 JSR osword
600 LDA msg
610 AND #&DF
620 CMP #ASC "Y"
630 BEQ pull
640 JMP error
650 .pull
660 PLA
    :TAY
670 PLA
    :TAX
680 PLA
690 .over
700 JMP (vec)
710 .message
720 LDA msg,X
730 JSR &FFE3
740 CMP #ASC "?"
750 BEQ out
760 CMP #13
770 BEQ out
780 INX
790 JMP message
800 .out
810 LDA #7
820 JSR &FFEE
830 RTS
840 .error
850 BRK
860 ]
870  ?P%=43
880 P%=P%+1
890 $P%="Aborted"
900 P%=P%+LEN $P%
910 [ OPTN%
920 BRK
930 .block
940 NOP
950 NOP
960 NOP
970 NOP
980 NOP
 990 NOP
1000 .vec
1010 NOP
1020 NOP
1030 .tmp
1040 NOP
1050 .msg
1060 NOP
1070 NOP
1080 NOP
1090 ]
1100 NEXT
1110 $(P%)="Are you sure?"
1120 $(P%+LEN $P%)="Utility connected
     "
1130 PRINT TAB(13,0)"Save Utility"
1140 PRINT TAB(8,2)"(c) 1984 The
       Micro User"
1150 PRINT TAB(12,4)"by Marcus Adams"
1160 PRINT '"Call with"'"CALL &A00"
1170 PRINT '"SAVE M/C COPY WITH"'
     "*SAVE ""SVCHECK"" A00 + D0"
```

This listing is included in this month's cassette tape offer. See order form on Page 177.



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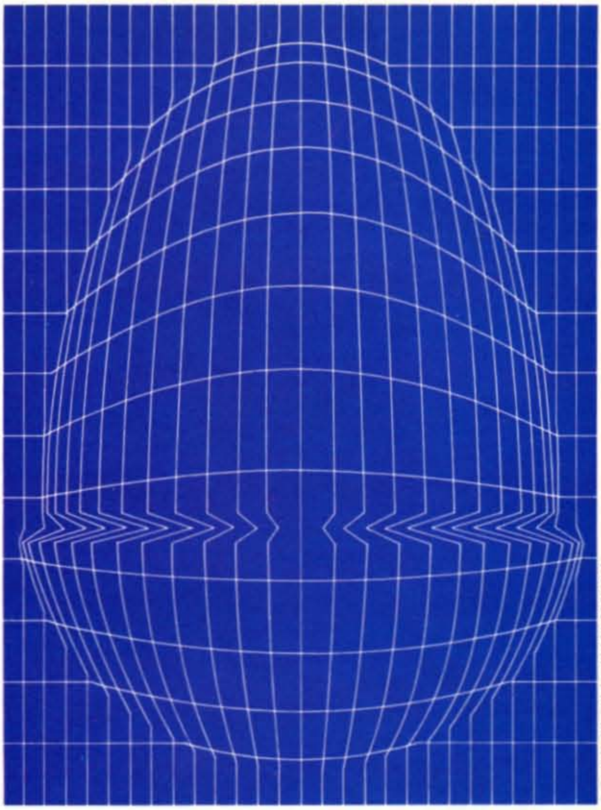
* Please note 10am to 2pm on Thursday 16th is Trade Morning – By invitation only.



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DOOM

DOOMRUN is quite simply one of the best games ever published for the BBC Micro. Its high speed action and stunning graphics will keep you enthralled for hours.

The scenario couldn't be simpler. Hurtling through a huge valley in the surface of a man-made planet you must destroy wave upon wave of hostile interceptors in your attempt to locate their motherships.

Having successfully eliminated the interceptors you are then free to rise to the surface of the planet to find and destroy the motherships.

While in the valley, use the cursor up and down keys to align your sights and the spacebar to fire.

When over the planet's surface use the V and B keys to move left and right respectively. The nearest mother ship's location will be indicated by the < or > symbols at the top of the screen.

A very important point now. Packing all this action into a Basic program means there is very little memory left. You must type it in EXACTLY as shown if you wish to avoid the dreaded "Bad mode" and "No room" messages. And of course, disc users will have to download it.

Despite being an all-Basic game, Doomrun runs extremely quickly. It achieves this speed by following three main principles:

- Draw as much of each scene as possible before each frame starts. This involves changing the physical colours used to draw black on black, bearing in mind that the scene must appear to move towards the player.
- With three logical colours used, turn each logical colour from black to the desired colour, then back to black when this PROC is called again.
- Use the GCOL3,x statement to make a spacecraft and other graphics move over the scene at will without erasing any of the background.

In order to meet the first criteria a lot of time was spent drawing and redrawing a scene trying to create a view suitable for the purpose of the game that did not take too long for the micro to draw.

Each scene is drawn from individual procedures for each frame – PROCpic, PROC2sc, PROCti, PROC3ti and PROC2ti.

Some of the procedures are used several times in different combinations for different scenes, the main purpose being to have suitably matched scenes at each stage of the game.

It will also be seen that as Mode 2 is used (all 16 colours are used in the second frame), there are only about 200 bytes free when the program is running.

Here lies the reason for such short PROC names and no unnecessary spaces. Take care typing it in!

The fourth frame continues from the third after a random period of time.

We fulfil the second criteria by using the BBC Micro's VDU19 statement. We can change any logical colour for any physical colour.

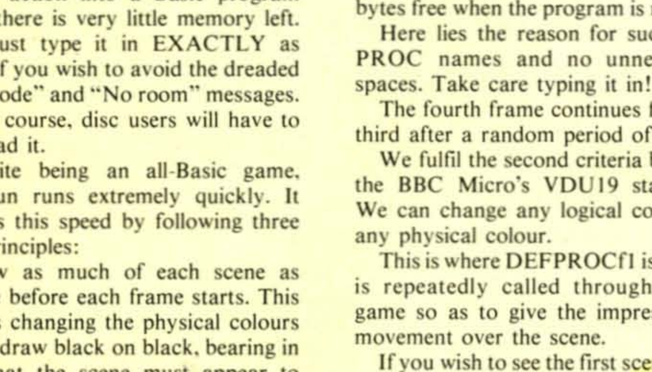
This is where DEFPROCf1 is used. It is repeatedly called throughout the game so as to give the impression of movement over the scene.

If you wish to see the first scene being drawn change lines 920 & 1870 to:

```
VDU19,1,1;0;19,2,2;0;19,3,3;0;
```

The same principle applies to the "grid lines" on the second frame, thus giving the impression of movement left or right.

The third essential was to enable a single colour craft to move over any area of the screen without erasing any of the background.



You may have noticed on some 3D games that the advancing target will only travel about the screen on a single colour background. This is due to the fact that if they strayed on to another colour the target would change colour.

To enable our spaceship to travel over any of the background colours used we use the GCOL3,7 statement. (This requires all 16 colours on the second frame.)

As a character is placed on screen, the micro looks at each bit of the image to be covered, takes its logical colour and EORs this with the logical colour of the new character. It then prints the resultant logical colour, for example:

BINARY
Existing *Logical Colour 3 = 000011*
New *Logical Colour 7 = 000111*
Resultant *Logical Colour 4 = 000100*

This is why on the first frame we use logical colours 1, 2 and 3 to draw the "moving" scene, and logical colours 4, 5, 6 (line 1880) are made physical colour 7 (white).

The same principle applies to the grid lines on the second frame, so that the ship may move under the red lines but above all other colours.

To remove the same character from the screen we simply reprint it on top of the existing character. This will, by the same calculation, make the original background reappear.

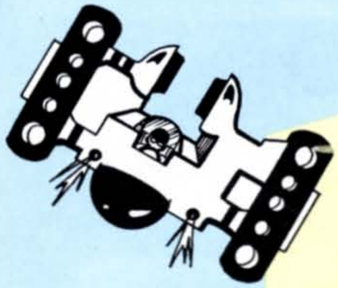
The biggest drawback to this is that every white image you see on screen has to be printed twice, slowing the game considerably, but despite this it still manages to run at a reasonable pace.

Note that lines 1 to 4 are there so that you may reduce the length of each game to enable you to check that your program will run through to the end, for example change line 280 to :

```
280UNTILJ<0ORsum%=2
```

If at first you find your shields failing too quickly you may change the random number on line 1700 to a higher value, as this controls the number of shots at you.

RUN!



PROCEDURES

PROCdi	Sets up dimensioned array.
PROCpic	Draws first scene.
PROCva	Sets up variables.
PROCsh	Draws first shield.
PROCst	Moves up to speed.
PROCfl	Changes logical colours to move scene.
PROCsi	Moves sights up or down.
PROCsp	Moves first ship.
PROCse	Erodes first shield.
PROCend	Finishes game to scroll screen.
PROC2nd	Plays second game.
PROC3rd	Plays third game.
PROC4th	Plays fourth game.
PROC2sh	Erodes second shield.
PROC2sc	Draws second scene.
PROCti	Draws grid lines.
PROCscr	Moves grid left.
PROCscl	Moves grid right.
PROCmo	Moves distant ship into attack.
PROC2sp	Moves second ship.
PROCx	Shoots at you.
PROC3ti	Draws third game lower grid.
PROC2ti	Draws third game higher grid.
PROC3sp	Moves third ship.
PROC2ch	Defines more characters.
PROC2she	Draws third and fourth game shields.
PROClg	Changes log col for ship to move under red lines
PROCfr	You shoot at ship.
PROCht	You hit ship.

Doomrun listing

```
    1REM line 280&300=sum%=2(7)
    2REM line 540&460=dim%=2(15)
    3REM line 700&350=sum%=2(15)
    4REM line 820&1380=sum%=1(5)
    5REM Allan Morris. (C) Micro User
 1984
    6ON ERROR GOTO2400
  100PROCdi
  110VDU23,240,0,0,0,0,0,0,0,24:VDU23
,241,0,0,0,0,0,0,60,24:VDU23,242,0,0,
0,0,0,126,60,24:VDU23,243,0,0,0,0,231
,126,60,24:VDU23,250,255,255,255,255,
255,255,255,255
  120VDU23,244,0,0,0,195,231,126,60,2
4:VDU23,245,0,0,195,195,231,126,60,24
:VDU23,246,0,129,195,195,231,126,60,2
4:VDU23,247,129,129,195,195,231,126,6
0,24:VDU23,248,0,0,0,16,56,124,56,16:
VDU23,249,0,129,195,255,36,255,195,12
9
  130MODE2:VDU23;8202;0;0;0;
  140VDU19,9,1;0;19,8,6;0;19,10,4;0;1
9,11,2;0;19,12,6;0;:ENVELOPE1,1,4,-4,
50,10,20,0,127,0,0,-5,126,126
  150PROCpic:VDU4:COLOUR12:PRINTTAB(3
,0)"range    score":VDU5:GCOL3,7:game
%=0:H%=0
  160VDU5:GCOL3,7:game%=0:H%=0
  170PROCva:PROCsh
  180PROCst
  190REPEAT
  200PROCfl
  210PROCsi
  220T1%=c%-RND(4)*d%
  230PROCsp
  240VDU4:COLOUR12:PRINTTAB(3,1);T%DI
Ve%;" Km ":VDU5
  250PROCse
  260IFJ<a%J%=4
  270IFJ<b%J%=1
  280UNTILJ<0ORsum%=7
  290IFJ<0VDU4:GOTO360
  300IFsum%=7phase%=phase%+1:VDU4:COL
OUR14:PRINTTAB(3,7);phase%" Phase Bea
ten":FORI%=1TO10000:NEXT:PRINTTAB(3,7
)"                ":VDU5:sum%=0:IFphase
%<3GOTO180
  310IFJ%=2H%=H%+2000
  320IFJ%=4H%=H%+1000
  330IFJ%=1H%=H%+500
  340CLG:VDU4:COLOUR12:PRINTTAB(2,0)"
Prepare Yourself":PROC2nd:H%=H%+1500:
FORI%=1TO5000:NEXT:CLG
  350IFP%>1PROC3rd:IFsum%=15PROC4th:P
ROCend
  360FORI%=1TO9000:NEXT:CLG:VDU4:COLO
UR12:PRINTTAB(0,10)"Your score was ";
H%:FORI=1TO9000:NEXT
  370COLOUR13:PRINTTAB(2,15)"Press Sp
ace  for       another game"
  380REPEAT
  390UNTILINKEY(-99)
  400CLG:CLEAR:GOTO100
  410DEFPROC2nd:LOCALI%,O%,Q%
  420VDU19,8,7;0;19,9,7;0;19,10,7;0;1
9,12,6;0;
  430PROCva:J%=4:PROC2sh:t%=32:PROC2s
c:PROCti:PROCscr:PROCscr:O%=100:Q%=10
1
  440VDU4:COLOUR12:PRINTTAB(2,0)" ran
ge    score "TAB(12,1);H%:VDU5
  450FORI%=0TO14:PLOT69,A(0,I%),A(1,I
%):NEXT:U=247:dim%=0:P%=1279
  460IFP%<1ORdim%=15ENDPROCELSE:PROCf
l:PROCfl:rnd%=RND(3000):FORI%=1TO500+
RND(2000):NEXT:PROCmo:PROCst
  470VDU4:IFx%>0PRINTTAB(4,1);"  >"EL
SEPRINTTAB(4,1);"<  "
  480VDU5
  490REPEAT
  500PROCfl:PROC2sp
  510IFINKEY(-O%)PROCscr
```

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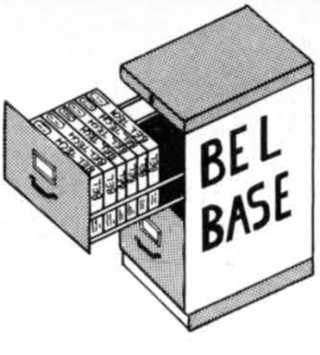

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In taking up the challenge you have to find the TALISMAN and locate a pentagram which then has to be prepared for the final rite. In the mean time dark forces will be opposing you making a difficult task almost impossible.

Do not allow yourself to the lulled into a sense of security for it will be short lived.

Many have gone before only to swell the ranks of the damned.

This is the latest adventure from the stables of Microtest and has been written with the acclaimed features of other adventures in mind eg save facility, quick response, simple but extensive commands, a mixture of logical and fiendish problems to solve.

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Available fonts are:

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•Data	Like the bottoms of cheques.
•Greek	It's all Greek to me too!
•Joined	Standard capitals with joined up lower case.
•Maths	A mix of until now unobtainable Mathematical symbols.
•Miscellaneous	A few oddities which often are very necessary.
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•Vertical	For labelling graphs.

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Access

Large picture shows BBC Computer System and a Quickshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE

Backward analysis doesn't solve all your problems

"WHAT the deuce is it to me", interrupted Holmes impatiently. "You say that we go round the sun. If we went round the moon it would not make a pennyworth of difference to me or to my work".

One wonders how the great detective would have reacted to the situation in which Dan Diamond, private eye à la Phillip Marlowe, finds himself in "Lost In Space" from Salamandar Software.

This is the second of the Diamond Trilogy, and Dan has been teleported through the Franklin Star Gate onto an abandoned space ship orbiting a planet.

As usual it is crawling with inarticulate security robots who keep dumping him in a vortex maze every time he presses a button.

Most of the ship is in darkness and the lift doesn't seem to work. We need a few clues.

The game comes with a neat 20 page booklet – the case file – filled with detailed pictures that are supposed to contain hints. I couldn't see any, so I got the real facts.

After about six Beethoven violin concertos of looking at the source listing it all became a three-pipe problem.

The robots will pester you about every 30 moves unless you are at the start, in the vortex (obviously) or in the swimming pool.

That's not because they rust – they barge into the shower quick enough – it's because they always "trundle up" to inspect you.

To keep them off you need the rubber duck? the soap? – nope, fact is most of the objects seem to be amusing red herrings.

Next thing is to find out how to work the lift and the lights (Barbara Woodhouse would have no problem here) and then, working backwards, turn on the engines and say password, therefore need black disc, therefore need red disc, therefore need blue disc, therefore need white disc . . .

Of course this backward analysis doesn't solve all problems. For example, it's easier to discover how to get the red disc by playing the game.

Nevertheless I got Dan down onto the planet in just over one hour of machine time BUT have no idea how long it would take playing fair – certainly days.

There is no Help facility in the program but a Help sheet can be obtained from Salamandar by return of post.

If you still can't solve the game with that then you shouldn't play adventures.

I tried this game for two reasons. The book of "clues in the pictures" seemed a good idea – rather like the Masquerade and Conundrum puzzle books – and I liked the screen layout, in which the description of the current room and what you are carrying are permanently displayed so you don't need Look or Inventory commands.

Your commands and the program's responses are shown in a seven line window at the bottom of the screen and it was quite interesting to see how the program "scrolls" these lines up.

The seventh line is for your input, and the program remembers and displays the previous six lines in six variables L1$ to L6$. At a newline the program does L1$=L2$:L2$=L3$:L3$=L4$:L4$=L5$:L5$=L6$:L6$=newline, that is, it shunts all the lines up one place.

Now this is most curious, because the BBC Micro has a window facility which the program has set anyway. Hit Esc, type LIST and the program only appears in the bottom seven lines. Type GOTO 65 and the game starts up again.

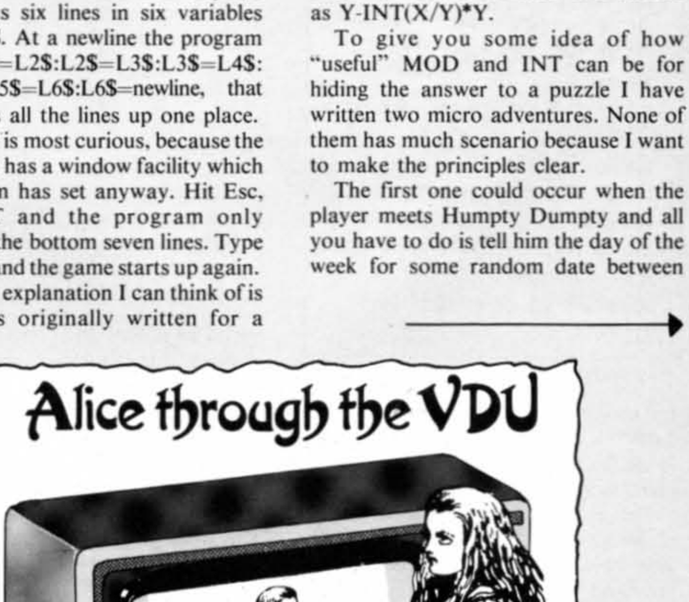
The only explanation I can think of is that it was originally written for a Dragon computer with, presumably, no window facility. But even so the "shunt" is not a very elegant technique – much neater is to use a cyclic buffer – a pointer MOD 6 into an array L$(5).

Quoting from the BBC User Guide, Page 299: "The function MOD" (actually it's an operator) "gives the remainder after division. When doing division by whole numbers . . . it is sometimes useful to know the remainder". Therefore PRINT 14 MOD 5 => 4 and PRINT −14 MOD 5 => −4; it's negative because X MOD Y is defined as Y-INT(X/Y)*Y.

To give you some idea of how "useful" MOD and INT can be for hiding the answer to a puzzle I have written two micro adventures. None of them has much scenario because I want to make the principles clear.

The first one could occur when the player meets Humpty Dumpty and all you have to do is tell him the day of the week for some random date between

Alice through the VDU



Our monthly foray into Adventure games

From Page 75

1710 and 2010 – there are about 100,000 possible questions.

Most children could understand this problem and some could even make a table to help them answer it, particularly if Humpty is impatient and only allows about one minute for the answer.

```
   10 D$="   SUN   MON  TUESWEDNES TH
URS   FRI SATUR"
   20 M$="    JAN FEB MAR APR MAY JUN
 JUL AUG SEP OCT NOV DEC"
   30 M=RND(12)
   40 IF M=2 THEN D=RND(28) ELSE D=RN
D(30)
   50 Y=1710+RND(300)
   60 PRINT "Today  ";D;MID$(M$,M*4,5
)+" ";Y;"  is my unbirthday"
   70 INPUT "What day of the week is
it",A$
   80 C=INT(Y/100)
   90 Y=Y MOD 100
  100 IF M>2 THEN 140
  110 M=M+12
  120 IF Y=0 THEN Y=99
  130 IF Y=99 THEN C=C-1 ELSE Y=Y-1
  140 M=M-2
  150 A=INT(2.6*M - 0.199)+D+Y+INT(Y/
4)+INT(C/4)-2*C
  160 WD= A MOD 7
  170 IF WD<0 THEN WD=WD+7
  180 WD$=MID$(D$,WD*6+1,6)
  190 IF INSTR(WD$,LEFT$(A$+"*",3))=0
 THEN PRINT "WRONG"
  200 PRINT "It is a ";WD$+"DAY"
  210 GOTO 30
```

Adventure I

A much neater way is to use a calculator that can extract the fractional part of a number (hence help calculate X MOD Y). Texas Instruments make one that is also programmable.

The second problem could have the scenario: "You can see a MOD2HEX safe which has three dials XXX." All you have to do is to open it, that is work out XXX – a random number between 0 and 999. You are allowed to dial up to three numbers whose total should not be >=32 and the program tells you the value of XXX MOD N for each number N. There are a number of ways of solving this one *without* using a table lookup.

As usual there is a prize for solving the last puzzle but I would emphasise that elegance is what counts.

```
   10 ON ERROR GOTO 110
   20 REPEAT
   30 T=0
   40 XXX=RND(999)
   50 FOR I=1 TO 3
   60 INPUT"You dial the number-",N
   70 T=T+N
   80 IF N<0 OR T>31 THEN 110
   90 PRINT"XXX MOD ";N;"=";XXX MOD N
  100 NEXT I
  110 INPUT"XXX=",A
  120 IF XXX=A THEN PRINT"The safe op
ens"
  130 PRINT"Try another combination"
  140 UNTIL FALSE
```

Adventure II

A number of readers wrote and told me how to get out of the Colossal Cave drowning maze. I had, to my shame, made the classic error of ignoring the most illogical direction.

I was also told how to get the LL9 batpak in Snowball, so mapping the web is no problem, but there is a simpler way which again I had overlooked.

Colin Bignell and Janet Margetts were most helpful with Snowball, both pointing out that the location of the crew member – and you do need him/her – varies each time the program is run.

Also the (Florence) Nightingales aren't really nasty but I have wished that they would do what Florence did after the Crimean War – spend 50 years in bed!

Bignell is convinced that the space suit needs airbottles as well as a helmet – why not try "Get airbottle" – and would also like to know how to reach the Siren's Island in Level 9's Dungeon Adventure.

He claims to have solved all of the Acornsoft adventures and almost all the Level 9 – it would be interesting to know how long he, and other people, have taken on these games.

A number of readers would like me to "rate" adventures. This is difficult because some games, such as The Hobbit and Twin Kingdom Valley, are intended for young players whereas older people much prefer massive text games.

If I review a game it is often because it has an interesting idea or gimmick like the Dan Diamond booklet and screen layout and often my only criticism is that the good idea wasn't implemented very well.

For example, The Hobbit has niggled a number of people because it promises a lot. You can talk to the characters in English, etc, but you quickly find that "they" don't really understand you.

Nevertheless it is a great idea and is being taken up by writers of other adventures such as The Wheel of Fortune from Epic Software.

In addition to interactive characters Epic has implemented multiple statement commands, for example N,S,E,W – which isn't too difficult – and claim that you can enter the following: "Drop everything except the kettle then go north and fill it from the tap. Return here and get the matches, sandwiches and cakes, boil the kettle and make the tea. Take the biscuits and eat them but don't eat the cakes or drink the tea"

Assuming that "Drop everything" and "Get everything" is allowed, then the program MUST break this sentence down into something like:

Drop everything	
Get kettle	IT$="kettle"
North	
Fill (IT$)	
Back	
Get matches	THEM$=THEM$+"matches"
Get sandwiches	THEM$=THEM$+"sandwiches"
Get cakes	THEM$=THEM$+"cakes"
Boil kettle	IT$="kettle"
Make tea	IT$="tea"
Get biscuits	THEM$=THEM$+"biscuits"
Eat (Them$)	THEM$="cakes"

I have assumed that "Don't eat the cakes" means that you will eat the biscuits, sandwiches and the matches. Of course the proof of this pudding will be to try it, but maybe Epic could enlighten me on how they do handle the semantics.

Incidentally, a number of readers rated games on the efficiency of the back-up service when they get really stuck. Level 9 and Acorn do particularly well in this category.

I can recommend the hint sheet from Salamandar Software because you get it quickly. It gives you the right hints at the right level and, if you're still stuck, you can still ask for more information.

Finally, for all those who queried my name – I thought everybody knew that A Programming Language was named after me long before Ada Lovelace was heard of.

I never did like her, and as for her dreadful gambling friend, Mr Babbage, words fail me . . .

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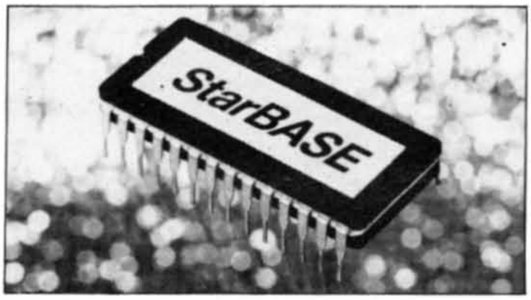

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Mastermind – just one in a hundred

The listing below has been reproduced by kind permission of Prentice-Hall, publishers of "100 Programs for the BBC Microcomputer".

THOSE fanatics who find even *The Micro User's* generous monthly helpings of programs insufficient to satisfy their appetite for listings should find plenty to interest them in the latest release from Prentice-Hall.

John Gordon's "100 Programs for the BBC Microcomputer" begins with a brief description of the fundamental aspects of using your BBC Micro. This is followed by a short set of programs which give a good outline of the micro's sound, graphics and animation capabilities.

The remaining programs are divided into categories such as mathematics, games, business and programs for the school. Whatever your interest you're bound to find some to suit you.

In fact the range is so large that we had quite a job to pick one as an example. We eventually settled on Mastermind, the perennial favourite.

JOHN GORDON
100
PROGRAMS FOR THE
BBC
MICROCOMPUTER
FOR MODELS A AND B
ACORNSOFT

Many thanks to Prentice-Hall for allowing us to reproduce it here – we feel sure that after sampling this one per cent of the book you'll want to try some more.

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
100 REM Program P11-Mastermind
110 MODE 7
120 DIM colour(3),guess(3),temp(3)
130 FOR I=0 TO 22
140 PRINT CHR$ (135);CHR$ (157)
150 NEXT I
160 PRINT TAB(12,0) CHR$ (149);"¦
      ¦  ¦  ¦"
170 line=0
180 FOR I=0 TO 3
190 colour(I)=RND(4)+144
200 temp(I)=colour(I)
210 NEXT I
220 REPEAT
230 line=line+1
240 FOR I=0 TO 3
250 colour(I)=temp(I)
260 NEXT I
270 PRINT TAB(3,23);
280 REM Program will be unsatisfactor
    y if more than 4 characters
     are input
290 INPUT "Enter colour pattern eg:
    RGYB "patt$
300 PRINT TAB(3,23) STRING$(40,"
    ");
310 FOR I=0 TO 3
320 guess(I)=149
330 IF MID$(patt$,I+1,1)="R"
    THEN guess(I)=145
340 IF MID$(patt$,I+1,1)="G"
    THEN guess(I)=146
350 IF MID$(patt$,I+1,1)="Y"
    THEN guess(I)=147
360 IF MID$(patt$,I+1,1)="B"
    THEN guess(I)=148
370 PRINT TAB(12+I*3,line) CHR$ (gues
    s(I));"¦";
380 NEXT I
390 pc=0
    :cc=0
400 FOR I=0 TO 3
410 IF guess(I)=colour(I)
    THEN pc=pc+1
    :colour(I)=0
    :guess(I)=1
420 NEXT I
430 FOR I=0 TO 3
440 FOR J=0 TO 3
450 IF guess(I)=colour(J)
    THEN cc=cc+1
    :colour(J)=0
    :J=3
460 NEXT J
470 NEXT I
480 IF pc>0
    THEN PROCposn
490 IF cc>0
    THEN PROCcolour
500 UNTIL pc=4 OR line=20
510 IF pc=4 CLS
    :PRINT TAB(12,12) "W E L L  D
     O N E !!", TAB(12,14);"YOU TOOK
     "line" ATTEMPTS"
    :END
520 CLS
530 PRINT '''''"THE CORRECT CODE
     WAS"
540 FOR I=0 TO 3
550 PRINT TAB(12+I*3,12) CHR$ (temp(I
    ));"¦";
560 NEXT I
570 PRINT
580 END
590
600 DEF PROCposn
610 FOR I=1 TO pc
620 PRINT TAB(25+I*2,line) CHR$ (149)
    ;CHR$ (172);
630 NEXT I
640 ENDPROC
650
660 DEF PROCcolour
670 FOR I=1 TO cc
680 PRINT TAB(25+pc*2+ I*2,line)
     CHR$ (150);CHR$ (172);
690 NEXT I
700 ENDPROC
```

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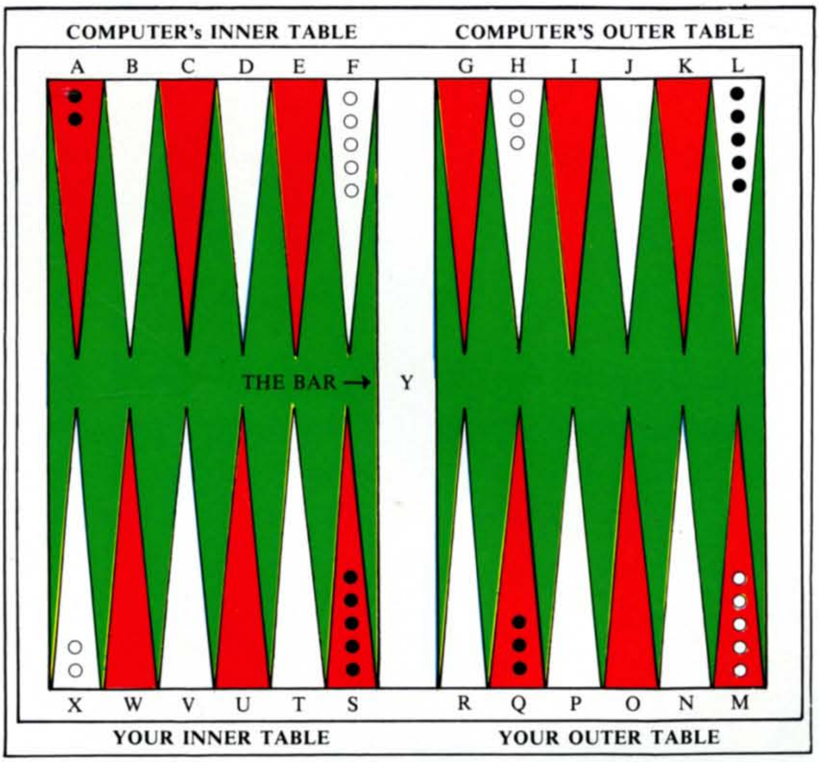
BACKGAMM



Layout of the Backgammon board showing how the pieces are set up at the start of the game. The computer's pieces are ○. Yours are ●.

BACKGAMMON is one of the oldest games known – it even pre-dates TV tennis – and is probably the best dice-and-board game invented.

The program outlined here plays against a human opponent or another computer. Before we look at it, here is a brief description of the game for those not familiar with the rules.

Backgammon is played on a board consisting of 24 "points", each player starting with 15 pieces. It is basically a race which is won by the player who removes (bears off) his pieces from the board first.

The initial position is shown in the diagram and the player moves clockwise from A to X. The computer moves in the opposite direction from X to A.

The game starts with each player rolling a die. The player with the higher score moves first with the displayed dice.

The rules governing movement are:

- Suppose a player rolls 3 and 5 – he must move one piece three points and the same or another piece five points, provided:

☐ The move is not off the board.
☐ The point moved to is not occupied by more than one opposing piece.

By
JEFF AUGHTON

☐ The player is not on the bar (see below).

- The dice may be taken in any order. That is, if a 3 and 5 were thrown, as above, the player may move the same piece 5 *then* 3 or 3 and *then* 5. While the total effect is the same (a move of 8), in some cases an initial move of 5 may be illegal whereas 3 is valid, and vice versa.
- A double gives the player four moves. For example, double 3 entitles him to move four pieces three points.
- Landing on a single opposing piece (blot) results in it being placed on the bar (point Y in our game).
- A player must return from the bar before making any other type of move.
- To return from the bar the player must roll a die that corresponds to a free point, or one with an opposing blot, in the opponent's inner table.

Referring to the diagram, if the player is on the bar and rolls 3 and 5 he may return on points C(3) or E(5) provided that is a valid move in accordance with the rules.

- As much of the dice roll as possible must be used – if offered the wrong die to use, pressing Z will select the other.
- When *all* of the pieces in the inner table have been assembled, they may be borne off. Rolling 3 and 6, for example, permits removal of a piece off the V point (3) and a piece off the S point (6).
- If there is no piece on a point *and nothing on a higher point* the player may bear off a piece on the next lowest point down.
- The winner is the first player to bear off all his pieces.

This program plays to these rules and gives a score at the end based on the position of the loser's pieces. This method of scoring is not official, but it does add extra interest.

Despite the chance element due to the dice, there is considerable skill in Backgammon and various tactics are involved in play. One of the most appealing features is that it is possible to win from seemingly hopeless positions.

It is not appropriate to discuss tactics here but, as players become better, they may wish to alter the weights (see variables list) to modify the program's style of play.

ON

Procedures

initial	Only entered once to define characters and read in program constants.
game	Controls the flow of a game from drawing the board, through playing the moves, to the end when the score is given.
setup	Short procedure initialising the variables to their start of game values.
board	Draws the board in conjunction with PROCpoints which draws a set of six points and PROCpiece which draws the pieces on point N%.
bar	Draws the contents of the bar for one player. The parameters passed are: starting line (15 or 17), type of piece (224 or 225), number of pieces to display.
dice	Randomises the dice and then rolls them.
you	Accepts the player's move and checks if it is valid. Once accepted, the move is made by calling procedures piece and, if necessary, bar.
me	Routine is responsible for making the computer's move. There is no need to check the move – computers are scrupulously honest! The computer asks itself the following questions: Am I on the bar? (line 2170) . . . Am I bearing off? (line 2330) . . . Is it a straight race? (lines 2410, 2440) . . . Given that I must make a normal move, which is best? (line 2450).
best	Selects the best move by offering PROCtrish – the evaluation routine – each die in turn. Effectively this is asking which die should I move with first and what is the best move with it?
trish	Attempts to make the best possible move with die D1%. It evaluates a number of factors for each potential move, such as: How many pieces are left on the point I'm moving from . . . How many are there on the point I'm moving to . . . Am I going to hit a blot . . . How far advanced is the piece? These factors provide an initial evaluation for the move, V at line 2770. Further factors are now considered: Am I leaving a blot behind – if so, where . . . Am I creating a blot – where . . . Can I set up a combination move by linking the two dice? The total evaluation is checked against the current best and, if better, the move is remembered (line 2830) as the best so far.
info	Displays message A$ at the top of the screen.
in	Gets input from the keyboard and prints it if it is in the range A to Z.
swop	Exchanges the values of the dice D1% and D2%.
wait	Two-second delay.
rules	Displays the rules.

Main variables

A%(25)	The contents of the 24 points A-X are held in A%(1)-A%(24). Each human piece scores –1, and each computer piece scores +1. Empty points obviously score 0. Thus the state of the game is determined by this array together with Cb (Hb) which is the number of computer (human) pieces on the bar. A%(25) is used as a temporary store for moves off the board when bearing off. Its value is meaningless.
WF(5)	Contains the weights associated with each move *from* a point. For example, WF(2)=–300 because it is generally unwise to move from a point containing two pieces.
WT(5)	Contains the weights associated with each move *to* a point. Much fun can be had by adjusting these weights to produce different styles of play. It is almost certain that the weights used can be improved to produce a better player.

Four other weights are used:

WD%	Factor determining how likely the computer is to move its back pieces. Refer to line 2770 to see why you must adjust it with care.
WH%	Value of hitting a piece, depending on its position – see line 2790.
WB%	Value (negative) of leaving a blot, depending on its position.
WC%	Value of making a combination move. This enables the computer to play most of the standard opening moves.
Cp (Hp)	Number of computer (human) pieces on the board at any time.
D1%,D2%	Two dice rolls.
M%	Number of moves left in a turn.

Full listing starts on Page 137

EUREK

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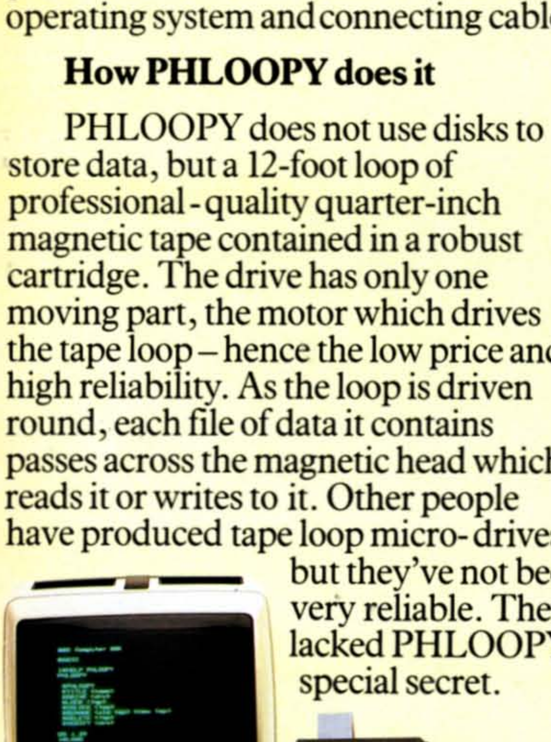


PHLOOPY's special secret

The heart of the invention is a brilliantly designed "byte-wide" magnetic head, made by Phi Magnetronics who build multi-track heads for professional use. PHLOOPY's head records and reads nine tracks across the width of a quarter-inch tape. That means the tape loop can be much shorter, so the typical time to access a file is reduced to a mere 3 seconds. If you're used to waiting for a cassette tape to trundle programs into your BBC, you'll be amazed at PHLOOPY's performance.

Getting it right every time

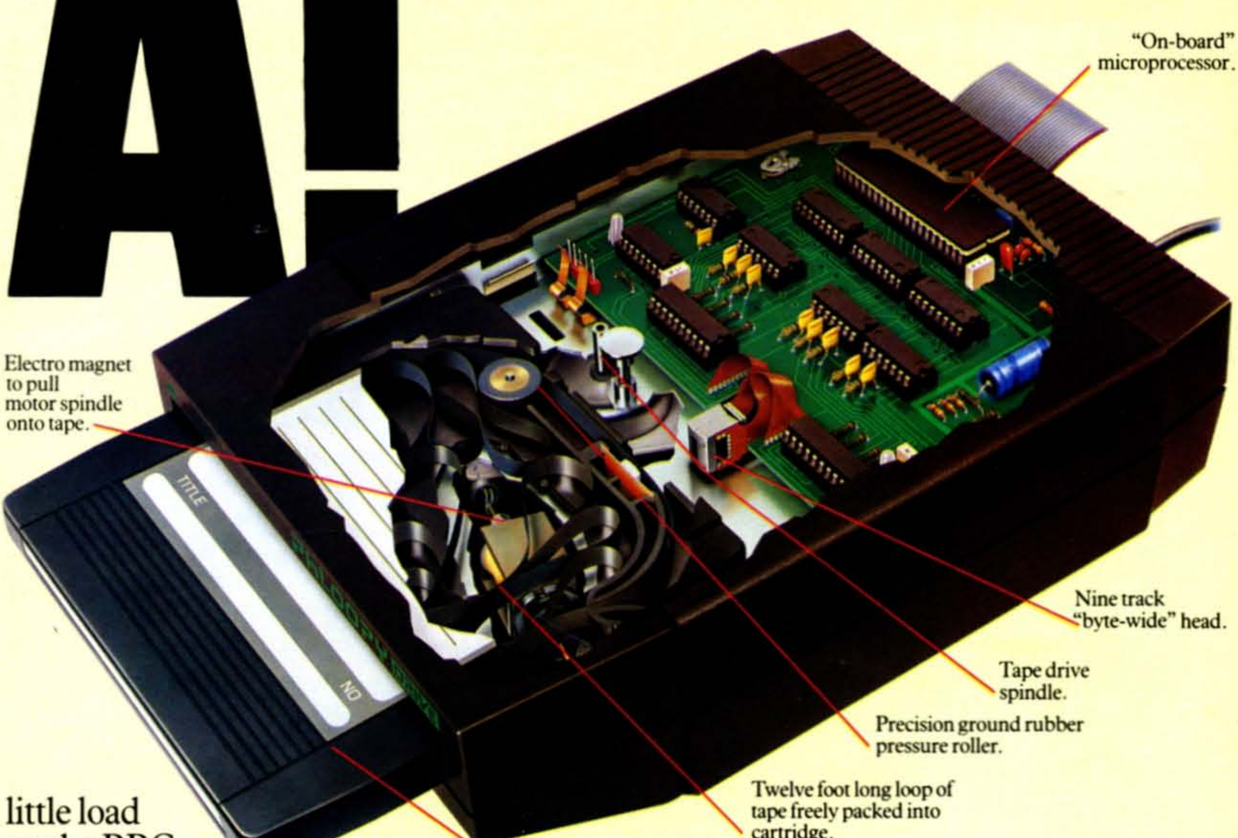
In addition, we've included a feature we know you will appreciate. PHLOOPY has full error detection and correction, so you can be certain you will get back what was originally written onto the tape.

Talking to your PHLOOPY

PHLOOPY's own software, contained in ROM, responds to standard BBC filing system and Basic commands. Most programs written to run on disk or cassette should run on PHLOOPY without problem.

And because PHLOOPY contains its own intelligent microprocessor – a second computer which does most of the hard work – PHLOOPY puts very

KA!


"On-board" microprocessor.
Electro magnet to pull motor spindle onto tape.
TITLE
NO
Nine track "byte-wide" head.
Tape drive spindle.
Precision ground rubber pressure roller.
Twelve foot long loop of tape freely packed into cartridge.
PHLOOPY 100k cartridge, shown not yet pushed fully home.

little load on the BBC and uses much less RAM than most disk systems.

Installing PHLOOPY on your BBC

You'll be amazed how simple it is to install PHLOOPY. Just plug in the interface cut two resistors (clearly marked in the instructions) and the job is done. If you should have problems our engineers are waiting to help you.

Making a PHLOOPY Library

PHLOOPY cartridges hold a full 100k of data or programs. Two of them come free with the drive and extra ones cost £3.75 each plus VAT. They are moulded of high impact polymers for protection and store easily on a bookshelf. Many programs will be available to purchase on PHLOOPY.

Phi Mag Systems Ltd.
PO Box 21, Falmouth,
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Telephone: (0326) 76040.

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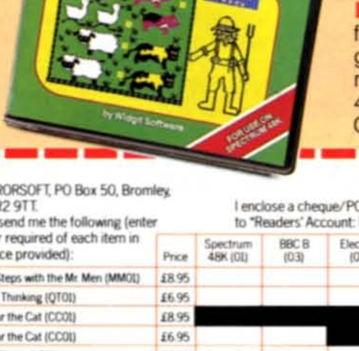
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MIKE COOK'S PROBLEM PAGE

Stepping out with two motors

I WAS very interested in your article Torqueing Of Stepper Motors, having just completed a project on stepper motor control using a BBC Micro.

In the project, two stepper motors were used to run a small Meccano vehicle, one on either side.

Interfacing both motors was done using an Octal Darlington Driver IC from R.S.

Each of the eight drives on the IC could sink 500 mA and also had the benefit of being protected against inductive leads. If you can get hold of an RS catalogue, you'll find more details of what I think is an extremely useful chip.

The motors being on either side of the vehicle moved in opposite directions. This was accounted for by using a reverse stepping sequence for one of the motors.

To turn a corner the useful AND command was used followed by the addition of the next number in one of the motor's sequences.

For an eight digit binary number, either AND 15 or AND 240 was used to change a high nibble or a low nibble.

For example:

```
        1010    0010
  AND   1111    0000
        1010    0000
```

High nibble Low nibble

then add on next number for one of the motor sequences:

```
        1010    0000
    +   0000    0110
        1010    0110
```

A set of Inkey subroutines was used to control the left, right, or stop movements etc.

If you devised an alternative use for the one motor in your building packs, the other spare circuits on the Octal Darlington Driver could be used to switch on lights or other equipment. – *Stephen J. Minshull-Beech, Beeston, Nottingham.*

● Thanks for your interest, and your description of driving two motors. The reversal in direction could be achieved by swapping the wires on the motor or, as you did, reversing the stepping sequence.

I am aware of the Octal Darlington Drivers (order code 303-422) but decided not to use them for the stepping motor kits. There are several reasons for this.

Firstly, power FETs take less current to drive them and you can only hang one Darlington Drive on each output of the user port whereas with power FETs, the number is nearly unlimited.

Secondly while it is true that the drivers are protected from the back EMF generated by inductive loads there is still a problem when switching inductive loads at high speed.

This occurs because the current and voltage through the switching device get out of phase and a transistor – used in the driver – operates on current but is switched by a voltage.

This can cause what is known as commutation problems, where a device is supposed to be off it is really on. This will only happen when switching at high speeds.

The FET works by a controlling voltage and so does not suffer from this problem. This is not to say that the drivers will not work – it is just that the power FETs will cope with a wider range of conditions.

ROM board on board?

I HAVE followed the developments and reviews of ROM extension boards for the BBC Micro in your and other magazines, for I am faced with making a decision about one in the near future.

Of those available, the various reviews praise this or condemn that, so that no one seems to have found a fully satisfactory solution.

Some appear to have heating problems, some are fiddly to fit, and with all there is the problem of exchanging ROMs, what with the board being in the bowels of the Beeb and having to open it up.

Is it therefore conceivable, indeed feasible, to locate the board outside the Beeb, not exactly in an old biscuit tin, but protected and linked once and for all to the innards with a ribbon cable?

I've never seen a board out here and don't know what is involved, but could this be a Body Building course? – *T.G. White, Wabern, Switzerland.*

●IT is possible to mount add-ons outside the computer. However there are several snags. The major one is that the extra length of wire needed to bring out all the connections would lead to a deterioration in the signals so that the computer would stop working, or at best perform erratically.

To prevent this you would have to make a properly screened and terminated bus. I suspect it would even have to be buffered. It is obvious that this would be expensive, and as such no manufacturer so far has considered it commercially viable to have such a system.

The second snag is that ideally you would need a header cable to plug into a ROM socket and so far you cannot get 28 pin headers as they don't make them.

I suspect this will be rectified in the future and it could possibly be the basis of a Body Build article – but I am in the hands of the component manufacturers.

Component connections

I HAVE taken your magazine since it first started. In the October 1983 issue there is a construction project for a light pen.

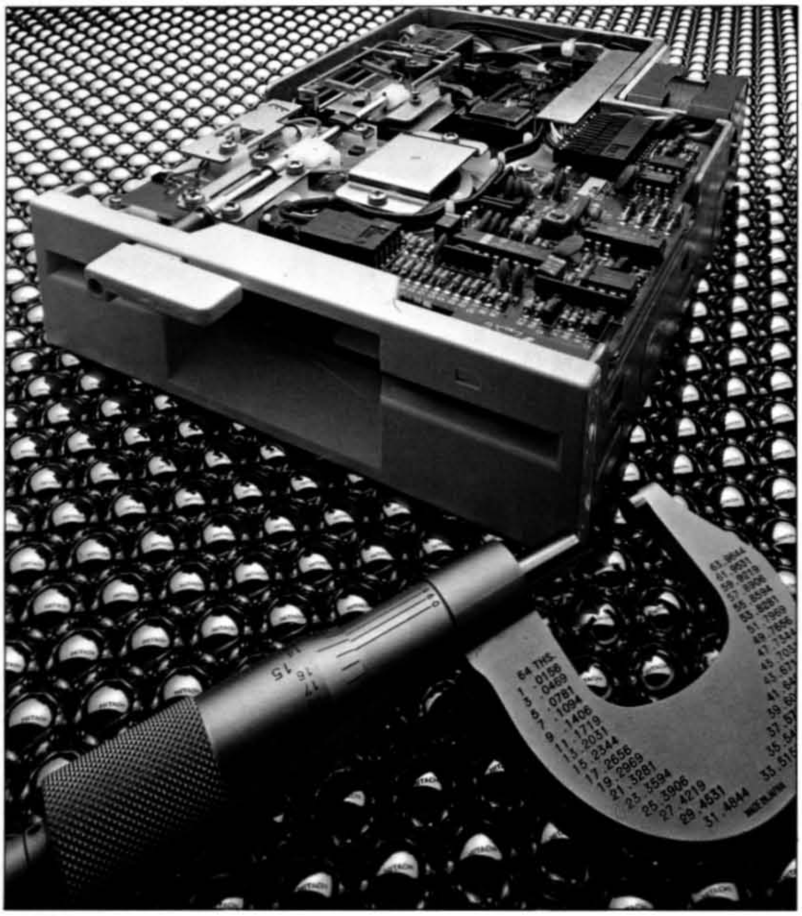
You recommend the S.D. 4324 002 Sweet Spot photodector made by Honeywell.

I have tried to get one of these for months without success. Where can one buy this piece of equipment? – *P. Peach, Runcorn, Cheshire.*

● The reason for *The Micro User* selling kits of parts for the Body Build articles is that some components are hard to get hold of. However the one you want

→

HI-TECH MEANS HITACHI.



If you thought that all Floppy Disc Drives were alike – you'd be mistaken.
The HITACHI range stands out

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Dealer enquiries welcome and Quantity prices available. All goods sent overnight carrier (add £6 to order for drives. Add £2 to order for leads or cases).

ALSO AVAILABLE FROM:

RMK Electronics Limited
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16 Baldwins Gardens
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From Page 85

can be had from many sources.

Unfortunately most of them are trade-only dealers. Most component shops will order components for you from a trade source, adding a commission.

This part can be ordered from RS Components as stock number 303-270. Most shops have an account with them – they will not deal direct to the public.

I think you will find however that *The Micro User's* prices are quite competitive when you consider that you get all the components you need.

"A" upgrade

MY BBC Micro is a Model A issue two number 101909 and is fitted with four eproms.

During an upgrade to Model B with disc, etc, I needed to upgrade the OS to 1.2. I enclose the leaflet sent with the 1.2 OS and suppose it does give me some clues.

I put the OS ROM in socket 1 (PB04) and the Basic ROM which was in socket 1 into all of the other sockets in turn (PB01). At each switch on, a continuous tone is emitted by the speaker.

The leaflet advises me to ask the vendor for further advice – they send me a form to foward the micro for repairs.

I did replace the eproms in their former places and the outfit works satisfactorily – evidently some modifications are required – any clues?

I am a retired electronic engineer and have meters, scope,counter timer etc but alas as yet no circuit – but I can get details of ICs etc.

I would get great satisfaction as well as understanding the nuts and bolts if I can fix it. Hope you can help.

I am learning from square one from your magazine and read a lot without understanding yet. Its jargon, I realise, but things like OSBYTE are offputting until you realise that if probably means a byte of information to the operating system, but that's a guess, because unless you start on the floor there's no way I could guess at OSWRCH – the User Guide isn't much help really. – *T. Roberts, Hall Green, Birmingham.*

● What you have not done is to change the links that reconfigure the computer's memory map so that locations &C000 to &FFFF are addressed to IC 51 instead of being spread over IC52, IC88, IC100 and IC101 – the sideways sockets.

The links also change the access speed to these sockets. This allowed slower (cheaper) eproms to be used.

If you look at the board with the keyboard towards you then the points of the compass can be used to tell you which of the two pins must be covered with the shorting cover.

The links are all marked on the board with a number. The ones to change are S18-NORTH, S19-EAST, S20-NORTH, S21 TWO LINKS EAST/WEST, S22 NORTH, S32 WEST, S33 WEST.

On the OSBYTE name, you are quite correct. These are just labels the developers dreamed up when they were writing the operating system. They are supposed to be meaningful.

OSWRCH stands for Operating System WRite CHaracter as that is what it does. Other such fun names are OSRDCH (read a character) OSWORD (pass a word – lots of data – to the operating system) and OSNEWL (tell the operating system to start a new line on the screen).

The assembler used in writing the operating system, like most assemblers, has a limit on the length of the labels it can use, hence the cryptic messages.

Losing confidence

I HAVE a BBC Micro Model B fitted with a DFS. On switching on sometimes no messages appear on the screen, only a flashing cursor, and the Caps Lock and Shift Lock indicator lights remain on together.

When this happens the keyboard is disabled, but by pressing the Break key this usually retrieves the keyboard and the usual messages appear.

I have taken my computer to my local dealer on three separate occasions and this fault does not appear when he puts it on test, and the report I receive is that there are no problems.

I would value your opinion as it is frustrating and I am losing confidence in using the machine. – *J.H. Smith, Ackworth, West Yorkshire.*

● When a computer is switched on a circuit produces an automatic reset pulse – which is also generated when you press the Break key. It would appear that the pulse produced by your machine is just on the limit of operation.

Maybe a slight local variation in mains voltage accounts for why the dealer finds no fault.

This variation will not affect the operation of the computer, as the low voltage supply is regulated and will automatically compensate. However it might affect the speed of acquiring a working voltage from switch on. I am talking of only a millisecond's difference.

If you really cannot live with this fault you could try increasing the length of the pulse by altering the capacitor C8, found at the top left hand corner of the board, from 0.1uF to 0.22uF. The exact value is not critical. Just increase it to give you a longer pulse.

All of a flutter

I WONDER if you could give me advice on a problem I have with my BBC Model B which is about two years old.

When running programs which produce sound, there is a tendency for the picture on the TV screen to flutter. At higher volumes, the Shift Lock LED flickers on and off.

I have tried poking around inside for loose connections but have not found any.

I would be grateful for any assistance. – *E.P. Burdis, Jarrow, Tyne and Wear.*

● This happens with some computers on some TV sets. It is a combination effect.

Acorn's cure is to cut the power lead going into the UHF modulator – the tin box at the right hand corner of the board – and insert a 10 ohm resistor. Then solder a 50 uF capacitor from the modulator end of the resistor to the case of the modulator.

This will remove any voltage fluctuations from upsetting the modulator. The Shift Lock LED flickers when the sound buffer is full and is supposed to happen.

CBM tape unit snags . .

IT SEEMS to me that many educational establishments and user clubs, and even quite a number of users, have come through the Commodore route and have spare cassette units.

These units are obviously more professional than most of the recorders being used, and there are surely not too many problems "interfacing" this unit to the BBC.

Have you any experience of this combiantion, or can you forsee any snags? – *Ian MacDonald, Saline, Fife.*

● The tape recorders used on the Commodore units work on a totally different principal to the BBC Micro. They use digital pulses and not audio tones.

The cost of conversion would be more than the cost of a new high quality tape recorder.

Pulse rate for Electron

YOUR pulse rate monitor for the BBC looks very good. Is it possible to use it on the Electron? – *Jim Wheeler, Orpington, Kent.*

● The pulse rate monitor will work by itself. You will have to supply it with 5 volts and you can see the light flash in time with the pulse. To get this into the Electron however is another matter.

You will need a one bit digital input and an analogue input. This will have to be added onto the Electron.

Acorn's Plus 1 Electron upgrade contains all the interfaces you need. However there is something else in the pipeline that might just suit you. Keep your eye on the *Electron User*.

You've got a problem with your micro and you just can't sort it out on your own? Then write to MIKE COOK. If he can't help then probably no one can . .

All disc software now available on 3" disc – add £3.00 to printed prices.

BBC MICRO COMES OF AGE..

B-BASE: £25.00

β-BASE is a very powerful and very flexible database program. Because β-BASE is designed specifically for disks there are none of the limitations found in most database programs, which are usually upgraded cassette programs. β-BASE is not limited by memory and even the disk limit can be overcome easily to provide an unlimited file size. Take a look at the features listed below and compare it with so called professional programs at up to £400, we think that you will be amazed. Why limit yourself to a 16K eprom – B-base contains approx. 30K of tightly compacted code.

Maximum File Size (40 track) - 99k & (80 track) - 199k.
Maximum Record Size - 2k: Maximum Number of Fields - 200:
Maximum Field Length - 254 chrs.

Options Include:

1) WRITE - for adding records.
2) WORK - for displaying records, editing and deleting.
3) CALC - allows you to cope easily with fluctuating prices and VAT rates. (works with whole file or search lists). Uses EVAL function allowing complex calculations to be performed, and the results to be displayed on screen or placed in a nominated field.
4) SEARCH - multiple function search on up to 5 fields.
5) OPTIONS:
   a) sort records found in search on 3 fields in ascending/descending order (max records sorted is 500).
   b) work search list, with edit and delete.
   c) save records found in search to disc.
   d) load previously saved search list.
   e) make a search list.
6) PRINTER - copes with parallel and serial printers and allows you to set up the printout + all printer codes allowed + allows you to join fields together and allows you to set them into columns etc. A label print routine allows single or double labels to be printed.
7) REDEFINE - allows you to transfer all records from old file to new file plus add or amend field or record size. No more re-entering all your data if you wish to add a field.
8) TRANSFER - allows you to transfer selected records between files.
9) NEW - allows you to define new file.
   + real time clock + many more features.

If you want a professional database for the BBC micro the β-BASE is your only option.

Not compatible with Amcom DFS.

REPLICA II: £12.00

This is the one that everybody has been waiting for. The original REPLICA set a very high standard and many said that it could not be improved. The specification that we set our chief programmer included some supposedly 'impossible' features. In fact ACORN state that some of the things that we have done are impossible, it just took us a little longer that's all. REPLICA II will transfer most of your cassette based programs to disk, even more than REPLICA did. Now when you buy disk drives you do not have to throw away your expensive cassette based programs. REPLICA II will transfer 'LOCKED' programs, programs loading as files, programs that load below &E00, those with up to 6 sections and those up to &6E in length eg adventure programs. No more waiting for 6 minutes whilst your adventure programs load. REPLICA II is very easy to use and the user just enters a name, how many sections and whether CHAIN, *RUN or *LOAD is used to load the first section. Press play and let the program do the rest, even a menu. You cannot afford not to have a REPLICA II, think how much it will cost you to buy just 1 disk version of your favourite program – it is probably more than REPLICA II which will hold up to 16 programs, limited only by the disk capacity.

BEEBSYNTH: disk £11.00 cassette £8.00

A very powerful yet easy to use sound generating program that can be used by expert and novice alike. Up to 16 envelopes can be defined and saved. The envelope definer is very easy to use, control is through the cursor keys, and the effects of your changes can be heard immediately. When you have defined your envelopes press 'K' for Keyboard and the keyboard is transformed into a musical instrument, but you control which instrument. Lets you play chords, not just single notes, change pitch and duration etc etc. A superb program that you can use immediately. Unlimited sounds at your disposal. Recommended by MICRO USER, PCN, HCW etc.

THE KEY: £12.95

A disk utility program that provides the user with the tools to explore the disk environment and use it to its best advantage. The programs are:

1) FORM40 - Formats and verifies 40 track disks.
2) FORM80 - Formats and verifies 80 track disks.
3) BACKUP - Allows backup copies of your valuable disks to be made.
4) EDITOR - Enables the user to read the disk sector by sector and to alter programs on the disk, even most protected and unlistable ones. More fun than any adventure game.
5) RETRIEVE - Allows the user to recover data or programs that have been accidentally erased or damaged by a head crash.

Every disk owner should have one, you will wonder how you ever managed without it. Recommended by WHICH MICRO, EDUCATIONAL COMPUTING etc. 'THE KEY' has been imitated by many but bettered by none.

available at larger Boots

JOYSTICK UTILITY: £6.00

Converts non joystick programs to work with joysticks. Works with any program using INKEY (-) in Basic or machine code, to detect movement, which applies to most programs. The routine is relocatable and sensitivity of the joystick can be varied. Compatible with most games, including Acornsoft. Very easy to use, just press the keys you want to transfer. The machine code can be saved as a block of just 100 bytes. Supplied on cassette but can be transferred to disk.

available at larger Boots

SHADOW: £8.00

SHADOW is a tape cloning program that will enable you to make security copies of your own valuable cassette software. SHADOW works with 99% of all known programs including those with sections at 300 BAUD and those that load as files. SHADOW will handle programs with any number of sections and it will work with any of the current operating systems including 0.1, 1.0, & 1.2. SHADOW is the definitive tape backup system and as a bonus you also get 'INSPECTOR' on the same tape. This allows you to view all areas of memory, search and alter bytes, etc. Colour coding helps to simplify memory usage. All this for just £8.00, I don't know how we do it. 'It is a condition of sale that this program is not used for piracy".

GRAFKEY/GRAFDISK disk £12.95 cassette £9.00

The 'GRAF' series of programs are, to our knowledge, the cheapest entry to the CAD (Computer Aided Design) field on the BBC micro. Input is by either joystick or keyboard. All graphics modes can be used and altered whilst running, the functions provided are: Line, rectangle, triangle, circle, text (upper and lower case), paint and colour pallet (8 colours and flashing). Drawing aids include: Alignment grid, circle copy, delete, free memory, purge memory, variable cursor speed, clear screen and redraw. Save drawings to tape in about 20 seconds or to disk in about 2 seconds. Rubber Band is a very flexible line drawing facility and has to be seen to be believed. Pictures can be savedand included in your own programs, very easily. GRAFDISK also provides a screen save facility. Recommended by BBC MICRO USER, PCN, ELECTRONICS & COMPUTING, LASERBUG ect, used by universities, colleges and business, as well as the enthusiast.

SINGLE KEY: (requires 1.2 O.S.) £5.00

SINGLE KEY ENTRY provides the user with single key entry of all 66 keyworks on the BBC micro. Speeds up your program input, it's just like having 66 function keys and it only occupies 256 bytes. Compatible with BASIC 1 & BASIC 2.

EDUCATIONAL PROGRAMS

THE GARDEN: £8.00

A series of three programs to help children with colours, spelling and recognition. The three programs cover three overlapping age ranges from bright four year olds to eleven year olds. The first level concentrates on colours and requires a simple Y/N answer to a question. The other two levels are orientated towards spelling and sentence structure. A sentence is presented with a missing word and the child is required to choose the correct word from a list and then type it in. Using this method each exercise involves a sentence, three words and picture/word relationships, all of which help to expand the child's vocabulary and understanding. Excellent graphics are used to reinforce the teaching. All three programs are provided on each tape and are compatible with disks.

COUNTING: £6.00

Like 'THE GARDEN' this program uses good graphics to interest the child whilst engaged in learning. Various levels can be chosen with a maximum number of 20. Aural stimulation can be selected if required and allows the child to do the counting in various ways, it can even be done with eyes closed. The objects for counting are rockets that blast off, flowers which bloom, jack-in-the-boxes that jump etc. and are used to stimulate interest. Makes counting fun.

TAKE-1: £6.00

TAKE-1 is by John Sekula, the author of the acclaimed COUNTING program above. This new release concentrates on subtraction and again uses excellent graphics including sideways scrolling to gain the child's interest. Suitable for children counting up to 20 but the graphics are suitable for all. Recommended and praised by many teachers and parents. Give your children the start they deserve.

MATCHING: £7.00

A bumper tape of four programs covering numbers, words, shapes and patterns. Graphics have been deliberately minimised to avoid distraction from the subject. They are ideal for infants and pre-school children. 'NUMBERS' provides various levels and alternative methods for counting. The space bar can be used as a counting stick and a visual and aural reward is given. 'WORDMATCH' again has various levels and the child is required to match the subject word with its partner which is in the displayed list. There is a choice of moving the word or moving the marker. 'SHAPE MATCH' can be of use to all ages and has a wide difficulty span. The cursor keys are used to move the subject shape onto the correct match and they will then merge if the answer is correct. 'PATTERN MATCH' is similar to 'SHAPE MATCH' but colour patterns are the subject instead of the geometrical shapes. This program introduces shape, colour and relational concepts and can even be of help in detecting colour blindness, although any suspicions should be confirmed by an expert.

INTRO: £10.00

INTRO is a simple computer programming language which uses the immediate visual response of 'turtle graphics' to introduce a number of programming concepts and techniques and to illustrate a variety of mathematical ideas in the areas of measurement, pattern, angle, and the use of variables. INTRO is similar to LOGO but with some important and deliberate differences. The most obvious is the screen layout which sets a section of the screen aside as a scratch pad with room for instructions to be displayed. Another important difference is in the way procedures are defined, in LOGO you must decide before typing in the procedure but in INTRO the current program can be stored as a procedure by typing STORE NAME, or whatever. INTRO has a very full instruction set, permitting great flexibility in handling graphics and in addition allowing access to the BBC's mathematical functions, INKEY etc. Programs and procedures can be saved to tape just like normal programs. INTRO is supplied with a comprehensive nineteen page manual as well as demonstration programs on the tape. INTRO can be transferred to disk but files must still be loaded and saved on tape.

HUE-MEN £6.00

Designed and written especially for pre school children this program is loved and admired by everybody that sees it. It has proven a big hit with children and adults alike and no collection is complete without a copy of HUE-MEN. This program is the best example of animation in MODE 7 seen to date, yes MODE 7. We cannot praise this program too highly and it is actually educational too. The subject is colour and HUE-MEN succeeds in extending young children's attention span without the teaching element even being noticed. Recommended for children of all ages.

SHAPE-MEN: £6.00

SHAPE-MEN is by the same author as HUE-MEN, Phil Reynders, and uses similar concepts to aid in shape recognition. Again using MODE 7 and sound this program will extend the child's attention span considerably. A real must and both these programs are recommended by PRIMARY EDUCATIONAL SOFTWARE REVIEW.

ALL educational software is supplied on tape – but can be easily transferred to disk.

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Electron cassette lead 7 DIN-3 Din + 2.5mm Remote Jack	£2.95
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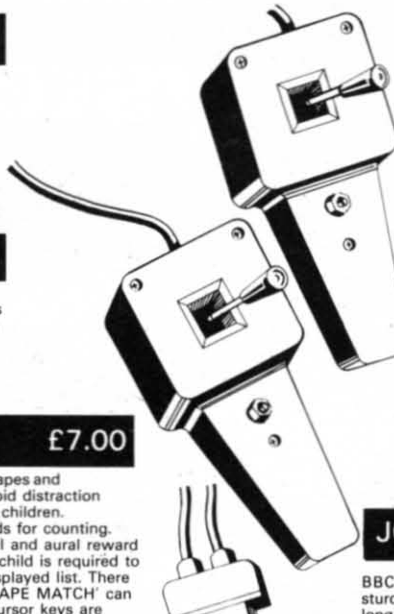
VIEWpoint £12.00



VIEW PRINTER DRIVER FOR EPSON FX80

Multi-page driver with print menu allowing the setting of global (document wide) printer functions at printer initialisation.

1) Multiple choice of highlight options including underline, italics, bold, enlarged, proportional, condensed, superscript, subscript.
2) Choice of any one of the nine language character sets held in the printer ROM.
3) Choice of PICA or ELITE type face.
4) Print intensity: normal or dark.
5) Single sheet or continuous printing.
6) Slow (accurate line feed) or fast print speed.
7) Choice of "PAD" character. Selection of " " as the PAD character switches off the backslash trap to allow full implementation of the foreign language character sets.

User Defined Character Definition

The print menu program also contains a sophisticated character generator which allows the construction of 95 user defined characters which are then accessible from VIEW via a highlight option.

The characters are displayed in an 8 × 11 grid and can be printed (singly or as a set), stored, examined or changed at will.

Supplied on disc with comprehensive user manual.

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JANUARY 1984
DISC SYSTEM GUIDE

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Quiz answers come in a flash

ANSWER BACK
GENERAL KNOWLEDGE

AS a sequel to its foreign language learning series, Kosmos Software has launched the very aptly titled Answer Back, a general knowledge quiz for the over 11s.

It combines a large series of quiz subjects with a space game, which though simple in concept, I found difficult to master.

The control program is loaded first and displays a menu which enables you, by a single keypress, to (L)oad the quiz of your choice.

You are then asked for one of the filenames, which on the contents box are described and numbered Q1-Q15. The subjects covered are astronomy, music, natural history, famous people, science, art and architecture, language, discoveries and inventions, sport, literature, films, TV and theatre, history, legends and mythology, geography and pot luck.

Once the data is loaded you are returned to the menu where you can (B)egin the quiz. The next screen allows you to select what kind of quiz you wish to participate in – (M)ultiple Choice, (Y)s-No answers, (C)omplete the missing letters, or a (S)election of all three.

You are asked how many questions you want, up to a maximum of 50, and whether you would like to be timed.

As you start the quiz a robot appears in a moonscape setting complete with three craters.

With flashes of the robot's laser the letters of the question appear in the sky. If you answer correctly a flying saucer immediately takes off.

You fire at it using the spacebar to activate the robot's laser. You automatically hit the saucer, but the object of the exercise is to drop it directly in the centre of the middle crater. If you succeed the whole screen flashes in a simulated explosion.

This I found to be extremely difficult to accomplish, although I suppose if I were to get more answers right I would become more proficient! However if you get the answer wrong the computer gives the correct answer and you don't get your free shot.

You are also given the option of passing any question that you don't know the answer to. On completion of your selected number of questions a summary of your performance appears.

You then have the option to repeat the questions you answered incorrectly or to discover the answers to the questions that you passed.

There are other options on the opening menu. You can (C)reate your own quiz by successively entering lists of questions and answers in the appropriate boxes displayed on the screen.

Each question must be accompanied by a correct answer and at least one wrong answer.

The additional two answers for the multi-choice selection may be omitted if desired.

Mistakes can be corrected easily with the Delete key provided the Return key has not been pressed. The shorter the questions, the more you can get in until the "FILE FULL" prompt appears.

A number of keys pressed with Ctrl enable you to enter accented characters when required, for example in language quizzes.

When you have finished entering the questions you are returned to the menu to (S)ave the file. You can also (V)erify it if necessary.

From the initial menu questions can be (A)dded to a file, (D)eleted from a file or (I)nserted anywhere in a file.

The quiz is supplied in a superbly illustrated package and the instructions are clear and easily understood. The price of £10.95 is not unreasonable having regard to the content.

Alan Sergeant

Fruity Freddie offers rich pickings

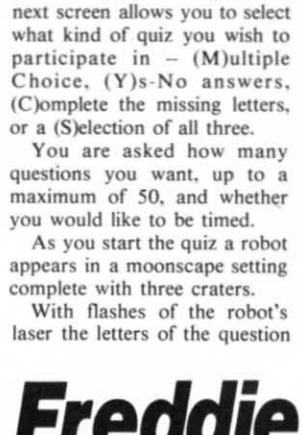
IN Fruity Freddie, the latest release from Softspot, you play a little boy collecting fruit from Mr Meano's back garden by moving around the screen using preset keys.

The fruit starts off as flowers, which quickly grow to full bloom. You must pick the fruit at just the right time in order to score.

If you tread on the flowers before they turn into fruit Mr Meano, who is looking out of his window, chases you all over the garden. If he catches you, you lose one of your three lives.

You can collect when the flowers turn into large bulbous fruit. The larger the fruit the more points you score, but if you leave it too late the bulb splits into four seeds which start growing in different spots.

Mr Meano also keeps a beehive from which bees emerge to chase and sting you. If they succeed that's another life gone. However there is a can of DDT around which will knock the bees senseless. But you'll have to be quick because your can soon runs dry.



Then there's the Crazy Crimson Caterpillar which darts across the garden and will bring you down if you get in its way. And a sparrow with rather powerful droppings! Avoid these at all costs – they're killers.

At the top of the screen your bonus quietly ticks away and if it manages to reach zero before you complete the screen then you forfeit another life.

There are several other temptations in the form of goodies which appear at random in any of the four corners.

These are worth bonus points but you'll have to be quick to grab them because they soon disappear. The goodies appear in different forms on each level and include lollies, cakes and cans of drink.

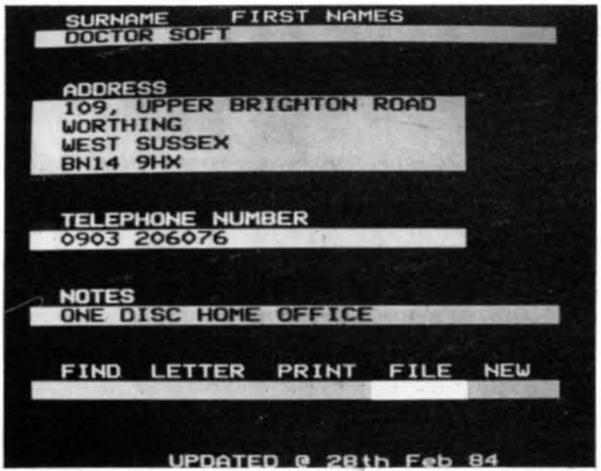
The game is quite fast and addictive and certainly makes a pleasant change from the standard "shoot'em up" arcade games.

It is very colourful, has good sound effects and at times can be quite frustrating.

It has the usual optional freeze and sound off facilities, but although the preselected keys are acceptable, all quality software should now be providing personal key selection – my only criticism of an excellent game.

David Mac

An office on one disc..but not for the businessman



```
SURNAME      FIRST NAMES
DOCTOR SOFT

ADDRESS
109, UPPER BRIGHTON ROAD
WORTHING
WEST SUSSEX
BN14 9HX

TELEPHONE NUMBER
0903 206076

NOTES
ONE DISC HOME OFFICE

FIND  LETTER  PRINT  FILE  NEW

UPDATED @ 28th Feb 84
```

ONE Disc Home Office by Doctor Soft is an integrated disc-based package consisting of a word processor, an address filing system and a financial spreadsheet, all aimed at the home user.

The system is already set up and ready to use, and in such a way that your name and address files link directly to the letter writing program, spreadsheets can be incorporated into documents for word processing, and so on.

On booting up you are asked for the date. You can enter this in any form and it will be remembered until you switch off, to be used in all letter headings and file up-dates.

The package is centered on a master menu which enables you, by the entry of a single number, to select which utility you require.

Directory is a dedicated database for names, addresses and telephone numbers with an unchanging screen which makes it easy to use and it is linked directly with the letter writing program.

It will hold 100 names and can access a surname in less than two seconds. You move between the data field using the Return key and enter all details in capitals, although the program will later change these, when appropriate, for your letters.

The lower field is the option line for choosing between the options FIND, LETTER, PRINT, FILE and NEW.

FIND: Enter the surname in the appropriate box and then use the Return key to place the cursor in the FIND option.

LETTER: If you have found an address, in order to write a letter move the cursor to this option. You will then enter the letter word processor with your own address, the date and the destination address. Each line has been already changed to lower case where appropriate. It is for this reason that intitials should be entered with a space before them in the entry stage.

PRINT: Move the cursor to this box in order to print direct to an envelope, or you can have a print out of the whole record card.

FILE: Selecting this option will do one of three things, file a card, re-file an edited card or

→

QUICK RUNS

A first look at some of the latest releases

Battlezone 2000: *A 21st century war game against The Ogre – a computer controlled supertank. Your mission is to destroy the Ogre before it reaches the bottom of the map, by positioning your forces and weapons to their best advantage.* (Lothlorien)

★ ★ ★

Molecule: *Scientists have managed to isolate a killer virus that has been decimating the world's population. You have to discover its structure. The molecule is simulated by an 8 × 8 grid which conceals the atoms. Firing your photon ray from selected points you must reconstruct the atomic makeup.* (Bridge Software)

★ ★ ★

Sort Animator: *Watch five different sorting methods in action. You input the data, select the particular sort and the speed at which it takes place. The cassette contains full introductions, sort animator, a comparison program and an expanded version of the main program from which you can extract useful routines.* (O.I.C.)

★ ★ ★

Chemiplant: *As manager of the Astod plant your objective is to make money by producing the correct amount of Astod and avoiding Muckle (waste). Explosions, spills and maintenance all cost money and should be avoided. A hi-res diagram of the plant shows the process in operation.* (H & H Software)

★ ★ ★

Looney Lifts: *A hotel's lift operator, hungry for custom, you try to prevent guests getting to the ground floor without using the lift. Holes appear at random intervals for guests to fall through unless you jump them at the right moment. You must also take care of the luggage on the conveyor belt on the ground floor. Missed guests, and luggage count against you.* (H & H Software)

★ ★ ★

Killa the Upgrade: *Loaded in before Killer Gorilla, this cassette allows you a choice of starting levels. You can have extended jumps up to three times longer than normal, and can climb and jump while you're holding the ladder.* (Bit Twiddlers)

★ ★ ★

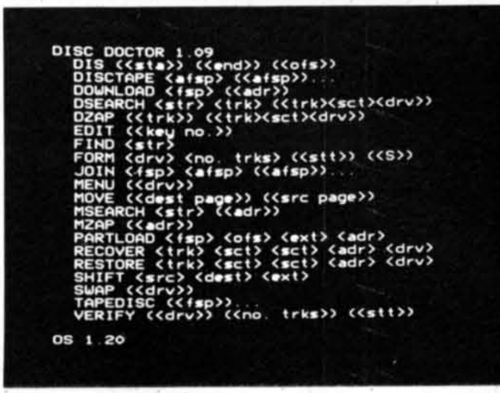
Alligata Calc: *A spreadsheet package designed as an introduction to financial planning. Aimed at the home, school or small business user, the program handles cashflow forecasting, budgeting, estimates, price lists, discount structures, profit and loss accounts and shopping lists, with optional integer or two decimal place numerics.* (Alligata)

COMPUTER CONCEPTS

ROM SOFTWARE
for the BBC Micro

Disc Doctor

£33.35 incl.



```
DISC DOCTOR 1.09
   DIS <<sta>> <<end>> <<ofs>>
   DISCTAPE <afsp> <<afsp>>...
   DOWNLOAD <fsp> <<adr>>
   DSEARCH <str> <trk> <<trk><sct><drv>>
   DZAP <<trk>> <<trk><sct><drv>>
   EDIT <<key no.>>
   FIND <str>
   FORM <drv> <no. trks> <<stt>> <<S>>
   JOIN <fsp> <afsp> <<afsp>>...
   MENU <<drv>>
   MOVE <<dest page>> <<src page>>
   MSEARCH <str> <<adr>>
   MZAP <<adr>>
   PARTLOAD <fsp> <ofs> <ext> <adr>
   RECOVER <trk> <sct> <sct> <adr> <drv>
   RESTORE <trk> <sct> <sct> <adr> <drv>
   SHIFT <src> <dest> <ext>
   SWAP <<drv>>
   TAPEDISC <<fsp>>...
   VERIFY <<drv>> <<no. trks>> <<stt>>

OS 1.20
```

DISC DOCTOR is a general purpose utility ROM which adds 20 new commands to the BBC Micro. Most of these are concerned with disc operation although some of the commands are general purpose.

The extensive range of disc commands include a disc search routine and a very easy to use sector editor which allows any sector to be examined and changed if necessary. The built-in formatting command has a special option allowing dual catalogues on each side of the disc, so that up to 60 files per side may be used - almost twice the normal limit.

⋆RECOVER and ⋆RESTORE commands are provided to help in the restoration of deleted or partially corrupted files. Any area of the disc may be transferred to memory, altered and ⋆SAVEd or ⋆RESTOREd back onto the disc. These commands prove invaluable when hours or even days of work are accidentally lost.

Many disc users often encounter the frustration of programs originally designed for use on cassette and require relocating to operate on disc. Disc Doctor provides commands to help with the transfer. ⋆TAPEDISC and ⋆DISCTAPE provide a simple means for automatically transferring non-protected files between tape and disc. Once programs are on disc, there are several relocation functions available. ⋆MOVE will move a program from one page in memory to any other. ⋆DOWNLOAD will load the program from disc and automatically move it to a specified position. ⋆MENU is more comprehensive still, offering a menu of programs available and allowing single key-press selection of any one. The chosen program is then loaded, re-located if necessary and automatically executed, whether BASIC or machine code.

General purpose commands include: ⋆DIS - which will disassemble an area of memory, following or skipping jumps, adding an offset, disassembling an instruction at a time or disassembling continuously.
⋆MSEARCH - to quickly locate any string of bytes in memory, specified either as a character string, numeric values of a mixture of both.
⋆MZAP - a very easy to use memory editor, allowing the user to scroll quickly up/down memory. It can be called from other programs to examine memory, then return to the program.
⋆EDIT - will list any or all of the function key definitions, so that the user may edit and copy them.

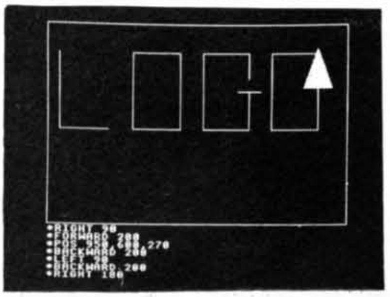
The DISC DOCTOR ROM contains a full help menu listing all the commands and their syntax for quick reference. A spiral-bound manual gives general information about discs and describes each of the commands in detail, with examples. Easy-to-follow fitting instructions are supplied, allowing the ROM to be easily fitted by even the inexperienced user.

Easy to Fit
DiscDoc

Graphics ROM

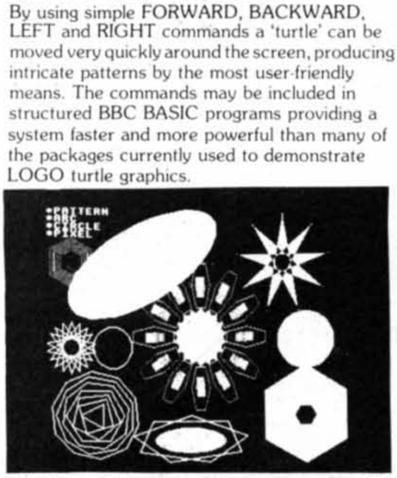
The GRAPHICS EXTENSION ROM brings 30 new powerful graphics commands to the BBC machine. The commands may be typed immediately or included within programs written in BASIC, BCPL, FORTH, etc. The commands act quickly (being machine code) and are always available without taking large amounts of program memory. The commands can be split into three catagories:

1. Sprite Graphics
A sprite is similar to a user-defined character, except that sprites may be multi-coloured, several times larger (8x8 to 24x24 pixels in size), they are easily defined and altered with in-built commands and may be saved and later loaded. Sprites may be displayed and quickly moved around. Up to 32 different sprites may exist at the same time. 'Films' may also be created, in which any sprite is treated as a single 'frame'. Each time the 'film' is used the next 'frame' in sequence is automatically displayed, allowing simple animation of sprites. Any number of the possible 32 sprite numbers can be defined instead as a 'film' which may include a list of up to 47 'frames' in any order.



```
*RIGHT 90
*FORWARD 200
*POS 950,600,270
*BACKWARD 200
*LEFT 90
*BACKWARD 200
*RIGHT 180
```

2. LOGO 'Turtle' Graphics
By using simple FORWARD, BACKWARD, LEFT and RIGHT commands a 'turtle' can be moved very quickly around the screen, producing intricate patterns by the most user-friendly means. The commands may be included in structured BBC BASIC programs providing a system faster and more powerful than many of the packages currently used to demonstrate LOGO turtle graphics.

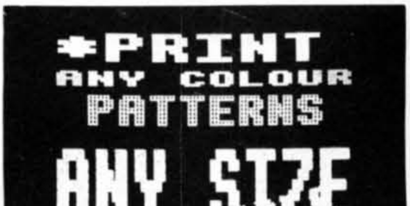


```
*PATTERN
*ARC
*CIRCLE
*PIXEL
```

3. General purpose commands
- ⋆ FILL will fill an intricate shape.
- ⋆ CIRCLE provides fast and easy circle drawing.
- ⋆ ARC fast easy arc drawing.
- ⋆ PLOT provides 3D graphics drawing by plotting with X, Y, and Z co-ordinates.
- ⋆ SCALE allows a scaling factor to be applied to everything subsequently plotted.
- ⋆ ROTATE applies a rotation upon all subsequent standard PLOT, DRAW and MOVE commands so that they are rotated around any origin.

A built-in help menu showing the syntax of all commands is provided for quick reference. Included in the package is a comprehensive spiral-bound manual and step-by-step fitting instructions, suitable even for the inexperienced.

Further details available upon request.



£33.35 incl.

VISA

Computer Concepts

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From Page 92

delete a card depending on the key option used when the card is on screen.

For example, Ctrl X deletes the file completely, any key enters it as a new file. You get a warning if you try to enter a file that already exists with the same name, and you must differentiate between the two.

You will also be prompted when the 100 files are full, at which point, if you have no files to delete, you will have to start a fresh disc.

NEW: Press any key to clear the display to find, or start, a new card.

DOCUMENT FUNCTIONS

f0	Insert, replace or add word or letters at cursor.
f1	Return to write mode.
f2	Insert blank line at cursor.
f3	Remove line at cursor.
f4	Centre a title.
f5	Review document using arrow keys.
f6	Right hand justification.
f7	Search and replace.
f8	Start new document.
Ctrl T	Set up to five tabs.
Ctrl L	Catalogues all files for loading.
Ctrl @	Escape from program.
Ctrl P	Send file to printer.
Ctrl S	Save file.

Document is the package's word processor and most of the techniques needed are either displayed on screen or on the function key label supplied.

The program works with a full 80 character screen and is therefore best used with a monitor. However there is an optional page width of 39 characters selectable at the menu stage.

The function keys are the heart of the system. Used on their own or with Shift they control all the functions that are likely to be repeated frequently on any document.

The other functions are controlled with Ctrl plus a letter key.

Wordkit is a utility for handling documents made up of several previously recorded documents. Pages can be compacted to equal lengths and then printed. The options offered are:

COMPACT: Takes up to four pages at a time and reduces them into 50 line pages. Easily executed following prompts.

CONTINUOUS PRINTING: Follow prompts for continuous printing of up to two pages already recorded on one disc. Designed for continuous stationery with 11 inches between perforations.

COUNT: Counts the number of words in a document page by page.

LETTER: A word processor package tailored to letter writing and integrated to the Directory. You can access it from the Directory or the master menu. It uses the same functions as Document with the addition that Shift with keys f0 to f3 produces useful letter phrases such as "Yours sincerely" and "Yours faithfully".

If you have arrived at LETTER via Directory, pressing Shift with f4 will print your address on an envelope.

If you wish to merge a set letter with a previously filed name and address, Shift f5 will achieve this using easy to follow prompts.

Calculate is a very small spreadsheet but a convenient way of making small calculations and printing the results.

Moving over the spreadsheet using the cursor keys you can enter text in title areas. Elsewhere you can only enter figures ranging from −9999999.99 to 9999999.99.

However calculations on the BBC Micro are not as accurate as some commercial calculators and financially important figures should always be checked.

The utility as well as adding and subtracting, sub-totals, averages and calculates VAT. When completed the sheet can be Ctrl (P)rinted, Ctrl (S)aved, Ctrl (L)oaded or replaced with a new one, f9.

In addition you have the option of merging it into a text document for word processing into a report or other document.

The package comes with a comprehensive instruction manual which is quite well laid out and easy to read, although the writer appears to have made an error when describing the function keys in the word processor – he omits f6 and from that point is one ahead finishing on f9 instead of f8.

The programs are much easier to use than they are to describe and are ideally suited to the home user who wants to expand his micro without great expense.

I would recommend it to the secretary of any small club or organisation which has a continually changing membership and a regular flow of mail.

The businessman however is certainly in need of something more comprehensive and tailored to his own requirements.

Carole Whitehead

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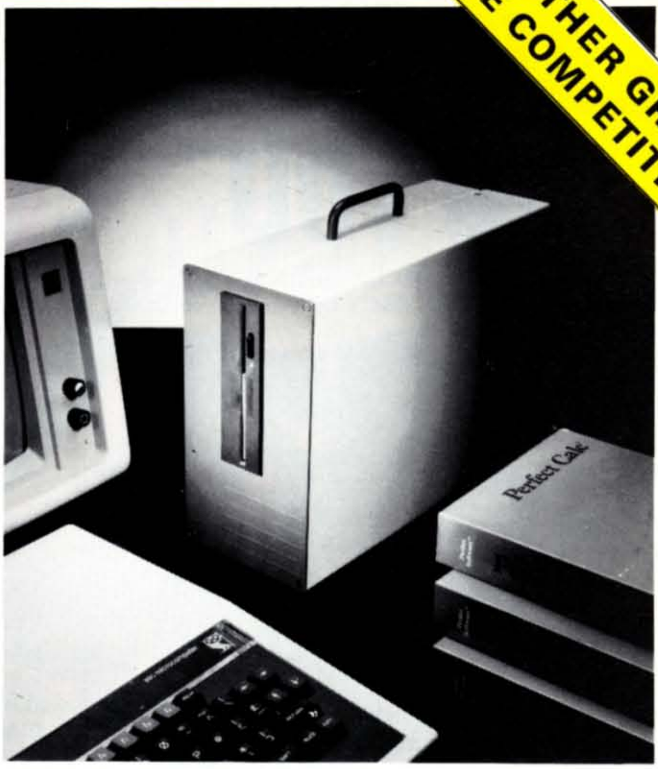
Escape from Orion (Hopesoft)	Nov 1983
Essential French Verbs (Carsondale)	Dec 1983
Facemaker (Ask)	Jan 1984
Firehawks (Postern)	Dec 1983
Forth (Level 9)	Nov 1983
Fortress (Amcom)	June 1984
Franklin's Tomb (Salamander)	May 1984
Frogger (A & F Software)	Mar 1983
Fungames (BBC Soft)	Apr 1983
Fun to Learn (Shard's Software)	May 1984
Galactic Firebird (Kansas)	Nov 1983
German Sentence Practice (Educated Owl)	Dec 1983
Ghouls (Program Power)	May 1984
Grafkey (Clares Soft)	Apr 1983
Great Britain Ltd (Simon Hessel)	Jun 1983
Gunsmoke (Software Invasion)	Nov 1983
Hide & Seek (Ask)	Jan 1984
Hobbit (Melbourne House)	June 1984
Home/Business Pack (Gemini)	June 1984
Home Finance (BBC Soft)	May 1983
Hopper (Acornsoft)	Sep 1983
Horror Castle (A & F Software)	May 1984
Hunchback (Superior Software)	May 1984
Hyperdrive (IJK)	Mar 1983
Inheritance (Simon Hessel)	Jun 1983
Invaders (IJK)	Mar 1983
Invaders (Software Invasion)	May 1983
Jigsaw (ega beva)	May 1984
Junior Maths Pack (Program Power)	Oct 1983
Lemming Syndrome (Dynabyte)	June 1984
Let's Count (Ask)	Jan 1984
Love and Marriage (Acornsoft/Ivanberg Software)	May 1984
Lords of Time (Level 9)	May 1984
Man (Chalksoft)	June 1984
Marklist (Optima Software)	Apr 1984
Mary Rose (Ginn)	Jan 1984
Missile Base (Acornsoft)	Apr 1984
Music (BBC Software)	Apr 1983
Music Editor (System)	Dec 1983
Music Synthesiser (Bug Byte)	Jul 1983
Number Puzzler (Ask)	Jan 1984
Oblivion (Bug-Byte)	Apr 1984
Old Father Time (Bug Byte)	Jan 1984
Omega Probe (Optima Software)	May 1984
Package 004 (Software Invasion)	Jun 1983
Paintbox (Oakleaf)	Mar 1984
Painter (A & F Software)	May 1983
Pascal, Sequences, Puncman (Chalksoft)	Nov 1983
Peeko-Computer (Acornsoft)	Feb 1984
Pengo (H Soft)	Feb 1984
Philosopher's Quest (Acornsoft)	Jan 1984
Physics (Program Power)	Dec 1983
Physiological Simulation (Fiveways)	Dec 1983
Pimania (Automata)	Mar 1984
Printer Monitor (Watford)	Mar 1984
Programs I (BBC Soft)	Apr 1983
Reading Music (Childsplay)	June 1984
Rocket Raid (Acornsoft)	Jul 1983
Screen Dump (DACC)	Mar 1984
Sea Lord (Bug-Byte)	Apr 1984
Shrinking Professor (A & F Software)	Apr 1984
Slick (BP Educational)	Jul 1983
Snapper (Acornsoft)	Dec 1983
Snooker (Acornsoft)	Oct 1983
Snowball (Level 9)	Feb 1984
Space Pirates (Bug Byte)	Mar 1983
Sphinx Adventure (Acornsoft)	Jan 1984
Spreadsheet (Microl)	Nov 1983
Sprite-Gen (DACC)	Dec 1983
Spy (System)	Nov 1983
Star Maze II (Kaydee)	Oct 1983
Starship Command (Acornsoft)	Oct 1983
Supergolf (Squirrel)	Mar 1984
Swoop (Program Power)	Sep 1983
Taxcalc (BBC Soft)	Nov 1983
Tess (H & H)	Apr 1983
The Grange (Dobsoft)	Jan 1984
Timeman One (Bourne Educational)	Sep 1983
Toolbox (BBC Soft)	Mar 1984
Transistors Revenge (Softspot)	June 1984
Vu-File (Psion)	Nov 1983
White Knight (BBC Soft)	Dec 1983
Wordhang (Bourne Educational)	Oct 1983
Wordwise (Computer Concepts)	Jul 1983
Zany Kong (Solar Soft)	Sep 1983

ANOTHER GREAT FREE COMPETITION

WIN

this amazing upgrade and give your BBC Micro the power of an IBM PC!



Data Technologies – Graduate G400

PRIZE for this month's competition is the amazing Graduate G400 – the upgrade that turns your BBC Micro into an IBM PC.

With Data Technology's Graduate plugged into the 1MHz bus you'll be able to take advantage of the vast amount of sophisticated software available for the IBM PC.

The Graduate gives your BBC Micro the extra power of a 5MHz, 16 bit processor, its on-board 128k RAM being expandable to 1.2 mbytes.

Not only that, this £600 system incorporates its own 400k BASF disc drive. The disc storage is independent of any DFS your BBC Micro might already have. It uses a specially adapted version of MS DOS.

Complete with integral PSU and I/O ports for keyboard and monitor, the Graduate features standard expansion slots to take advantage of the wide range of IBM add-ons, such as hard discs and communications modules.

We've hidden the names of several of the Graduate's features in the word square on this page. The words are hidden in straight lines, horizontally, vertically and diagonally. Spaces and punctuation are omitted.

All you have to do to win your own Graduate is to send the coupon back to us with the hidden features neatly circled.

We also want you to tell us how many you discovered – we're not telling you how many there are, but it's in double figures!

And finally, for a tie breaker, we'd like your suggestions as to why Data Technology chose to name their upgrade the Graduate – not more than 25 words please.

It's not too hard, so why not enter? Remember though, we have to receive your coupon no later than July 31, 1984.

Lucky 3

THERE were three prizewinners in our April competition – Martin Glass of Truro, John Royce of Barnsley and R.F. Bloodworth of St. David's.

The programs they'd like to see listed were respectively: OS 1.2 disassembled, an educational utility that adapts to the pupil's ability and a 6845 scrolling demonstration.

The last two we've got in hand, but the first might cause us some copyright problems – after all, Acorn did write it!

Your FREE entry form

I found ______ hidden features

It was called the Graduate because ______________________

____

____

____

____

Name ______________________

Address ______________________

______________________ Tel: ______________________

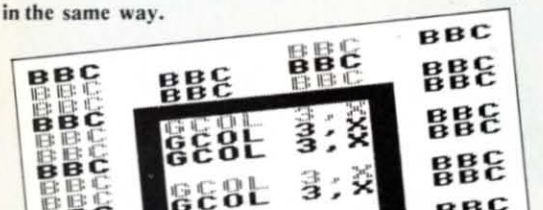
Send you entries to Graduate Contest, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

A	6	1	T	S	M	H	Z	D	T	M	O	R	V	X	W	O	T	H	Z
R	I	Z	R	E	A	S	1	I	8	8	8	I	E	B	V	R	H	T	H
G	E	B	A	S	F	D	I	S	C	D	R	I	V	E	M	D	E	P	S
V	U	X	M	1	6	B	I	C	I	D	S	G	S	B	D	A	S	R	D
E	S	N	P	C	M	M	H	S	A	T	1	R	G	L	O	T	S	O	O
W	N	D	V	A	O	S	H	T	R	V	6	A	1	8	O	A	R	C	P
I	H	1	O	1	N	M	D	O	T	I	M	D	M	L	G	T	T	Y	T
C	R	1	6	B	I	T	P	R	O	C	E	S	S	O	R	E	S	S	H
K	A	B	F	B	G	O	O	A	P	H	Z	N	D	L	O	C	K	E	T
1	6	I	I	A	I	R	I	G	T	S	O	P	O	O	G	H	R	H	O
C	H	E	N	W	R	T	A	E	X	I	L	T	S	N	S	N	Z	D	C
R	A	R	G	T	T	H	E	D	S	H	B	A	U	T	8	O	S	L	O
1	O	R	K	E	E	R	U	N	U	5	B	L	V	I	Q	L	D	S	M
N	E	S	S	Y	T	G	A	Q	M	O	R	T	E	Q	B	O	A	A	P
M	L	5	M	H	Z	P	R	O	C	E	S	S	O	R	U	G	E	M	A
C	5	8	H	P	X	5	Q	A	T	E	S	J	E	Q	S	Y	R	P	P
5	B	T	H	E	M	P	S	U	L	A	E	A	A	C	U	A	M	H	S
I	S	W	O	I	B	M	C	O	M	P	A	T	I	B	L	E	V	S	Z
E	P	R	O	N	I	A	R	1	B	A	S	F	D	R	I	V	E	C	D
A	G	E	K	D	D	P	1	8	6	7	P	U	P	R	O	T	A	S	H

EXCLUSIVE TO YOU

EXCLUSIVE, by George Sanderson, is a superb seven-part demonstration of the BBC's EOR graphic command GCOL 3,X.

Notice how the command affects both text and graphics in the same way.



```
   10REM ******************
***********
   20REM        GCOL3 Examp
le  (1)
   30REM      (C) MICRO USER

   40REM ******************
***********
   50REPEAT
   60MODE2
   70VDU23;8202;0;0;0;
   80PROCTITLE
   90MODE1
  100VDU23;8202;0;0;0;
  110PROCTEXT
  120D=INKEY(100)
  130UNTIL0
  140DEFPROCTITLE
  150VDU23,1,0;0;0;0;
  160FORP=0TO111:COLOUR P M
OD 6+1:PRINT" BBC ";:NEXT
  170VDU28,5,21,14,5:COLOUR
130:CLS
  180VDU28,6,20,13,6:COLOUR
128:CLS
  190FORP=0TO20:COLOUR P MO
D 7:D=INKEY(15):PRINT"GCOL
3,X";:NEXT
  200VDU26
  210FORX=1TO60:PRINT"":D=I
NKEY(10):NEXT
  220ENDPROC
  230DEFPROCTEXT
  240FORG=0 TO 200:DRAWRND(
1200),RND(1300):MOVE0,0:NEX
T
  250C=0
  260VDU19,0,4,0,0,0
  270REPEAT
  280Y=200
  290PRINTTAB(0,9)SPC(40)
  300PRINTTAB(0,10)" The fo
llowing is an example of GC
OL 3";SPC(11);"to EXCLUSIVE
 OR";SPC(18);"with any othe
r colour present";SPC(9);
  310PRINTSPC(40)'''
  320PRINTSPC(40);
  330PRINT" It works with t
ype or graphics in the";SPC
(16);"same way";SPC(58)
  340GCOL3,C:C=C+1
  350REPEAT
  360Y=Y+4
  370MOVE0,Y:DRAW1300,Y
  380UNTILY=900
  390UNTILC=4
  400D=INKEY(100)
  410VDU19,0,0,0,0,0
  420D=INKEY(100)
  430ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 177.

STOP PRESS

CUMANA PRICE LIST

Cumana BBC Microcomputer compatible disk drives: retail prices

Cumana disk drives supplied with formatting diskette, drive connecting cable and comprehensive user manual. Independent power supply, mains lead and moulded plug included.

CS100 Single 40 Track single sided	£169
CS200 Single 80 Track single sided	£209
CS400 Single 80 Track double sided	£233
CD200 Dual 40 Track single sided	£305
CD400 Dual 80 Track single sided	£386
CD800 Dual 80 Track double sided	£431
CD400/S Dual 80/40 Switchable single sided	£469
CD800/S Dual 80/40 Switchable double sided	£499

Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

CS100E Single 40 Track single sided	£153
CS200E Single 80 Track single sided	£195
CS400E Single 80 Track double sided	£219

Cumana disk drives supplied with formatting diskette, drive connecting cable and comprehensive user manual. Power supply taken from BBC Microcomputer, with lead supplied.

CSX100 Single 40 Track single sided	£149
CSX200 Single 80 Track single sided	£193
CSX400 Single 80 Track double sided	£215

★ Top quality 5¼ inch TEC and Mitsubishi Japanese disk drives
★ Fully assembled and tested before packaging
★ 12 months warranty
★ Attractive hardwearing cabinets in BBC beige

Available from the following retail outlets:
W. H. Smith, John Lewis Partnership, Greens Leisure, Laskys, Spectrum UK
Area distributors:
HCCS Associates (Gateshead) 0632-821924, Eltec (Bradford) 0274-722512, Basic Business Systems (Nottingham) 0602-819713, Walters Computer Systems (Stourbridge) 03843-70811, Microage Distribution (North London) 01-205 7688, J. S. Simnett Computers (South London) 01-390 6161, Ferranti & Craig (Basingstoke) 0256-69966, Gwent Computers (Wales) 0633-859582, National Micro Centre (Stockport) 061-456 9548, Microworld (Edinburgh) 031-228 1111, Microtest (Cornwall) 0208-3171.

+ National Dealer Network.
Please note: all prices exclude VAT and delivery charges.

REMEMBER...
...THE BEST NAME IN MEMORY

Print from Japan

Disk Drives from Cumana

CUMANA'S
DISK-DRIVE
for the BBC microcomputer
High quality 5¼ inch Japanese disk drives
Cabinet finished in hard wearing BBC beige
12 months warranty
Fully assembled and tested
CUMANA 1
CUMANA 0

Like the beautiful prints from Japan, Cumana disk drives represent the very highest standards in design and production. Also like the prints, Cumana disk drives represent the highest state of the art; and they not only look beautiful, they perform beautifully as well.

Cumana disk drives for the BBC Microcomputer are available in slimline single, dual and dual switchable versions. They have 12 months warranty, are fully assembled and tested before packaging, and are available — at unbeatable value for money prices — from W. H. Smith, The John Lewis Partnership, Greens Leisure, Laskys, Spectrum UK, area distributors (see below) and Cumana's national dealer network.

Look out for the distinctive Cumana packaging in your high street, today!

Area distributors:
HCCS Associates (Gateshead) 0632-821924, Eltec (Bradford) 0274-722512, Basic Business Systems (Nottingham) 0602-819713, Walters Computer Systems (Stourbridge) 03843-70811, Microage Distribution (North London) 01-205 7688, J. S. Simnett Computers (South London) 01-390 6161, Ferranti & Craig (Basingstoke) 0256-69966, Gwent Computers (Wales) 0633-215008, National Micro Centre (Stockport) 061-456 9548, Microworld (Edinburgh) 031-228 1111, Microtest (Cornwall) 0208-3171, DRG Business Machines (Weston-Super-Mare) 0934-415398, Kingdom Design (Belfast) 0232-643720, Hugh Symonds (Bournemouth) 0202-26535, Audio & Computer Centre (Jersey) 0534-74000.

The Highest State of the Art

For further information about Cumana disk drives for the BBC Micro, please complete and return this coupon.

Name ______________________

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Address ______________________

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Tel. No. ______________________

Interests:
Home Use ☐
Education ☐
Dealer ☐
Business ☐

MU7/84

Note: If dealer, please attach this form to your letterheading.

CUMANA
The best name in memory

Cumana Limited,
Pines Trading Estate, Broad Street,
Guildford, Surrey, GU3 3BH.
Telephone: Guildford (0483) 503121.
Telex: 859380.

FOR SPECTRUM, ACORN ELECTRON, BBC, and NOW the COMMODORE 64
British airways
HEATHROW
AIR TRAFFIC CONTROL
For the BBC MODEL B & the ACORN ELECTRON
HEWSON CONSULTANTS

HEATHROW

Air Traffic Control

YOUR TASK: to direct incoming aircraft from holding stacks to runway ... smoothly, safely and expeditiously.

YOUR INSTRUMENTS: Radar screen showing aircraft call signs, blips and trails. Four stack displays giving altitude, heading, speed and size.

EIGHT levels of play including a demonstration mode.

Choose an EASY mode to begin with ... landing light aircraft any way you can. Progress to more TRICKY situations ... mixed aircraft, restricted airspace, minimum separation, outbound traffic.

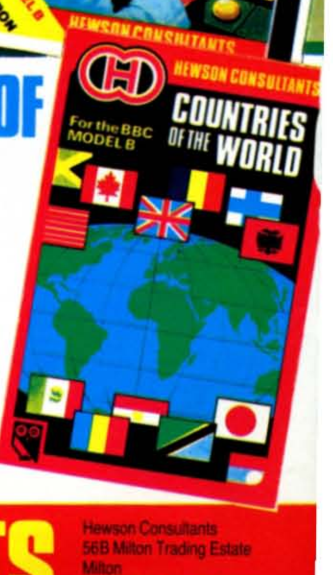
The ULTIMATE CHALLENGE. Emergencies, unknown aircraft, radio failure, loss of a runway, instrument failure.

£7.95

COUNTRIES OF THE WORLD

An educational package which gives an appreciation of the location of all the countries of the world. Includes detailed world map. Shows the location and names the capital plus population, area, currency, main languages and comparative statistics on the largest and smallest countries etc.
BBC Model B.

£6.95


HEWSON CONSULTANTS
For the BBC MODEL B
COUNTRIES OF THE WORLD

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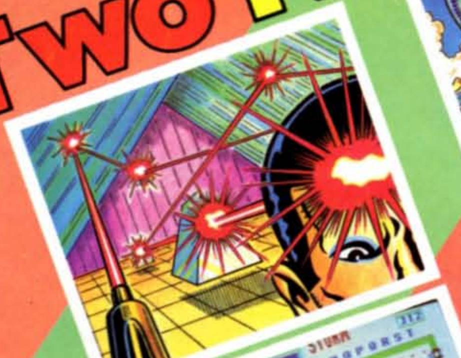
Log-on

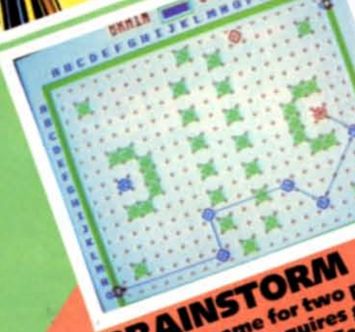
Plug into the exciting world of telecomputing!

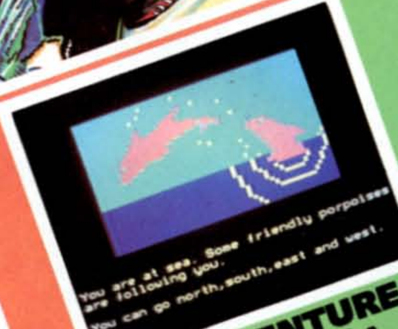
Virgin Games.

A name to PLAY with

Two New Releases







```
You are at sea. Some friendly porpoises
are following you.
You can go north,south,east and west.
```

BRAINSTORM

A unique game for two players. BRAINSTORM requires great skill and strategy to win. Each player has his 'brain' to defend from the Opposition's laser cannon. To do this he must place electro-prisms on the board to deflect the attacking laser. He must also use these prisms to deflect his own death-dealing ray into his opponent's brain. Each board (there is a choice of three layouts to choose from) has an obstacle course of pre-set prisms from the start. The deflection factor of these prisms is purely random and could mean thay you end up killing your own brain! Sounds a bit complicated? Well, it isn't really, although a lot of skill, nerve and tactics are required. It's a bit like chess – with lasers – only better.

SEA ADVENTURE

An adventure game with a difference! It not only features text but also highly colourful graphics to give the player a more realistic feel to the game. After a shipwreck, the player must find his way back to England by moving from place to place – islands, pirate ships, sea creatures and ghost ships are just some of the hazards he will encounter. One element that sets SEA ADVENTURE above all others is the one-key movement method. By pressing just one key the player can move north, south, east or west, pick up, drop, or use objects. This is a great bonus for players who are fed up with typing in long commands only to find that they are wrong.

£7.95 R.R.P.

COMMSTAR

Simply the most comprehensive ROM based communications software available for the BBC micro at the price!

Commstar is unique, it will allow communication with other computer users and allow access to large databases throughout the world via a suitable Modem (such as 'Grapevine' from Pace).

By utilising Commstar it is possible to access Prestel, Micronet, Homelink, Telecom Gold, and various 'Bulletin Boards' throughout the country and so enable you to have access to a multitude of information sources covering:- world news, weather, travel information, entertainment, computer programs, clubs, and even home banking!

In addition more specific emulation facilities can be obtained from a simple boot disc, (e.g. VT 100).

Commstar is extremely flexible allowing full configuration of the RS 423 (RS 232) port of the BBC micro, full XON/OFF protocol and 'safe' file transfer by the use of XMODEM protocols.

Still Only £34 inc. V.A.T.

Please telephone for full information data sheet.

P
PRE
PREST
PRESTEL
ESTEL
TEL
L

COMMSTAR OPTIONS:-

B - Copy to buffer on/off. All input from the host may be copied into a memory buffer which is approx, 23k in mode 7.

C - Exit menu to 'chat' mode to allow conversational access to bulletin boards.

E - Echo on/off - set echo on when using host terminals which do not provide an echo.

F - File transfer using XMODEM protocols. High integrity via use of enhanced 'Christiensen' protocols.

G - Get emulation-allows specific terminal emulation to be loaded from disk. e.g. VT 100.

I - Initialise RS 423 port for word length, parity and stop bits.

L - Load buffer from current filing system file for transmission to modem.

M - Toggle screen mode: normally mode 7,80 columns available in mode 3.

O - Output buffer to modem - speed may be varied to suit particular modem speeds.

P - Printer on/off, switches printer on or off line.

R - Reset buffer pointers.

S - Save buffer to current filing system file for 'browsing' later.

T - Transmit break level.

V - View current buffer contents on screen - display speed may be varied, or paused with optional dumping to printer.

W - .Wipe buffer prior to use of other buffer. commands it necessary.

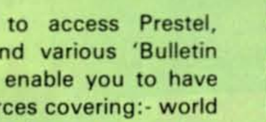
X - Toggle XON/OFF protocol.

★ - Issue any MOS command from within COMMSTAR.

♯ Terminal/Prestel.

@ Filter mask On/Off.

TOOLSTAR



A revolutionary new approach to program development aids.

Toolstar is an eprom-based suite of programmers tools which have been specifically designed to aid programme development and debugging on the BBC micro.

The new commands offered by Toolstar are:-

★ CONV
Convert between Decimal, Hexadecimal and Binary in any combination.

★ DFORMAT
Format a disc to the Acorn standard with any number of tracks within the capabilities of the Drive.

★ DLOAD
Load the data from the specified sector on a disc to memory.

★ DSAVE
Save the data from memory to a specified area on the disc.

★ DVERIFY
Verify a disc.

★ FIND
Search a BASIC program for all occurances of the specified string (mixed tokens/ASC11), and list all lines with string highlighted.

★ FIX
Repair a 'Bad Program' then list it.

★ FKEY
Display what is behind function keys in a format suitable for on-screen editing.

★ FLIST
List a 'Bad Program' with suspicious areas highlighted.

★ OPEN
Smart renumber parts of a BASIC program.

★ REPLACE
Selective replacement of one string by another in a BASIC program, including wild card options.

★ RESET
An unforgettable NEW!

THE FOLLOWING COMMANDS ARE DIRECTED AT THE WHOLE MACHINE MEMORY AND COMPLEMENT THE BBC MICRO'S ASSEMBLER:

★ MBRK
Installs a serial BRK handler giving CPU register and stack displays together with program counter and paged ROM value when BRK occured - can be used in machine code or BASIC.

★ MCOMP
Compare memory areas and list those where memory contents are not the same.

★ MCOPY
Smart memory copy form one area to another.

★ MCRC
Calculate a Cyclic Redundancy Check for the specified memory area.

★ MDIS
Full feature disassembler with parallel ASC11 display. Features include automatic labelling of Acorn O.S. calls and vectors, and on-screen editing. Includes reverse disassembler and scrolling.

★ MDUMP
Hexadecimal/ASC11 dump of memory with on-screen editing. As with MDIS, dumping may be carried out in reverse.

★ MFIND
Search memory for all occurances of specified machine code/ASC11 string.

★ MROM
All the M (Memory) commands can be directed at the specified paged ROM. e.g. BASIC, DFS, TOOLSTAR, WORDWISE etc.

★ MSEED
Fill the specified memory area with any value.

★ EXTEND
Expands the Toolstar to encompass RAM based utilities which then automatically appear under the ★ HELP command. This feature ensures that Toolstar is capable of future expansion.

All commands can be used from within a BASIC program. Toolstar comes complete with a very comprehensive manual (over 150 pages!), including many program examples.

£34.00 inc. V.A.T.

Please telephone for full information data sheet.

PACE

PACE.92 New Cross Street,Bradford.BD5 8BS
Tel.(0274) 729306. Telex 51564

MICROWEB

MICROWEB went live at 6pm on Monday, May 14. First caller was Bob Bembridge from Tring and since then there have been many hundreds more.

Within a few hours, *The Micro User* bulletin board had assumed a character all of its own, thanks to the lively, informative and amusing contributions from those logging on.

For anyone who hasn't yet accessed Microweb, here's just a taste of what's cooking on the liveliest board around.

IN GENERAL...

From: Garry Marshall
To: Sysop
How do I order cassette/discs from you?

From: Sysop
To: Garry Marshall
Just send us an E-mail message listing what you want plus your Access/Visa number.

From: Phil Coombes
Anybody interested in forming a net in the Bracknel area leave a message in the system with a phone number and I'll get to you.

From: Graham Martin
Thanks for being the first mag with a sense of adventure.

From: Jonathan Jackson
To: All
Is there anyone out there who would like to be my penfriend? I am 10 years old and very experienced with computers (for my age). Make messages private.

PROBLEM PAGE...

From: John Wallbridge
Do you know how to make a Tandy IV talk directly to a Beeb?

From: Jacqui Lyons
If you get the comms chip for the Beeb it should go into your model four via a cable obtainable from Technomatics Ltd.

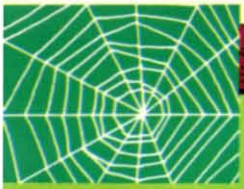
From Brian Williams
On a real Teletext system the user can press a reveal button to display lines hidden with the CONCEAL code. Is it possible to tell the Beeb's teletext chip to REVEAL all hidden characters, short of overwriting every instance on the CONCEAL code with, say, a space?

From: Sysop
To: Brian Williams
Oddly enough, I've just been talking to Mike Cook about this. REVEAL can be hardware implemented on the 6850, but the Beeb itself doesn't allow this – you have to POKE the characters out, as you say.

From: Martin Parr
Hi Mike this looks like your first problem – apart from me that is. Trying to re-map the Mode 7 screen, using registers 12 and 13 of the 6845 a la Advanced User Guide (great book!) the method does not seem to work. Putting high byte of new screen in R12, adjusting it with (high byte-&74) EOR &20 and putting the low byte in R13, I just get a blank screen! Any idea?

From: Robert O'Donnel
To: Martin Parr
Hi. I've no connection with the mag, but I might be able to help. You will have to tell the OS where the screen is. It's no use telling the 6845 what to display when the OS is putting its data somewhere else. Try changing the addresses stored in the bytes at &34A,B &34E,F &350,1 (see page 276 of the Advanced User Guide).

From: Martin Parr
To: Sysop
Hello again. Now that's what I call service – a reply to my Problem Page entry in under four hours.



NEWS...

Subj: 6502 2nd Processor

The new Second Processor from Acorn really is a beautiful bit of kit and well worth the pennies.

Did you know they're using the 65SC02 which has a legitimate extended character set? Not only that, Acornsoft – though you've to drag it out of them – are going to make use of it.

We've all known about the ordinary 6502's varying extended instruction set. Did you see the article in the mag for squirrels by the guy who's just noticed them? Hot stuff . . .

Subj: Interface

Acorn are currently in a legal wrangle with Interface over the latter's publication of The BBC Micro Compendium, whizz kid J. Ruston's latest effort. Trouble is, it's got a disassembly of Basic II with commentary on it and the nut factory aren't overjoyed.

AS you can see, Microweb's made an extremely lively start. All you need to log-on to us is a modem and suitable software. The Pace combination is ideal and, as you can see from the offer on this page, superb value for money.

You'll also need our number – it's:

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As well as the bulletin board, there are news pages, programs to be downloaded and electronic mail. Log-on soon, and you'll see why they're saying Microweb's a must for every BBC Micro User.

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Forget the past, get on to the right number and...

Serialise, modulate, communicate!

By ROBIN HUDSON

COMMUNICATIONS is perhaps the most interesting area of microcomputing that has yet to be explored by the majority of home computer users.

For many years now the public telephone network has been used to transfer data between computers which are often many hundreds of miles apart.

For companies using computers in this way the advantages are obvious. Large volumes of data, including programs, can be transferred between various establishments very rapidly and without the necessity to physically transport discs, tape or any other storage media.

It is only recently however that the additional equipment – both hardware and software – that was needed to take advantage of the telephone network in this way has become sufficiently inexpensive to be used widely in the home.

So let's examine the possibility of using the BBC Micro to communicate via the telephone system.

There are many advantages in doing so.

One major application is the ability to access data which is held on other, often very large, computer systems. The best known example of this is British Telecom's Prestel service, although many other public database systems exist.

This is an area which is currently arousing great interest, and which will no doubt become one of the more significant aspects of computing in the future.

The transfer of files to other computers, in the same way as is done between mainframe installations, is another area that has great potential in the home.

You've just written a new utility program which you would like a friend, who happens to live at the other end of the country, to test for you.

Instead of sending a tape or disc, which could take days to arrive, you could simply send a copy of the file over the telephone in the space of a phone call.

This applies not only to another BBC Micro. You could just as easily transfer a program to an Apple for example, although it would almost certainly require modification before it could be used.

Another type of system, the "bulletin board" is peculiar to micros. Bulletin boards were first developed in America where micro communications has progressed to a more advanced state than in Europe.

It is simply a micro which accepts telephone calls from other micro users and allows them to access its files, download programs, and, as with electronic mail systems, leave messages for other callers.

It is quite common to find that such systems operate on a worldwide basis with users calling from countries as far apart as Australia, Britain and America.

These are just a few of the possible applications. But what about the equipment required to use the telephone network in this way?

Fortunately the rapid development of large and very large scale integration technology in recent years has made it possible to produce suitable equipment at prices which are no longer prohibitive.

The obvious starting point is some form of interface, in the same way that a disc interface is required before data can be stored onto and retrieved from a disc drive.

Unlike the disc interface, however, a serial interface which is suitable for communications is built into the

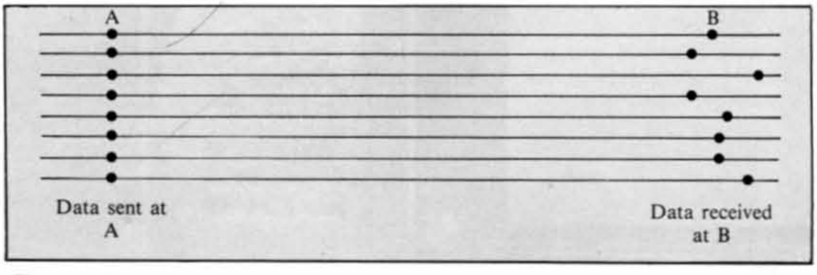

Figure I: Data skew in parallel transfer

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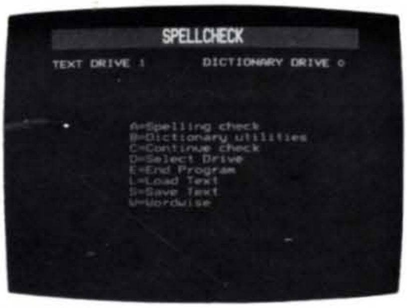

```
SPELLCHECK
TEXT DRIVE 1          DICTIONARY DRIVE 0

          A=Spelling check
          B=Dictionary utilities
          C=Continue check
          D=Select Drive
          E=End Program
          L=Load Text
          S=Save Text
          W=Wordwise
```

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SPELLCHECK is menu driven, and is the ideal companion for WORDWISE or VIEW. It provides an automatic spelling check for letters or documents.

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Random access files ensure very fast word retrieval from the dictionary disc.

SPELLCHECK is menu driven, and is very simple to use, allowing unknown words to be added to the dictionary, ignored or re-spelt.

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MASTERFILE

MASTERFILE is a general purpose data base, written especially for the BBC Micro. It is extremely useful, allowing vast amounts of information to be quickly stored.

Once set up, the information may be retrieved or sorted at any time, in a number of different ways, using any of the fields as keys.

Records may be instantly displayed or printed, using any printer suitable for the BBC Micro, also a label printing facility is included.

Separate versions of the program are available for cassette and disc based systems. The disc version uses random access files to maximise record storage.

One extra feature of the disc version is that it provides limited spreadsheet facilities.

TECHNICAL INFORMATION

The cassette version will allow up to 10 fields to be specified per record. Any number of files may be set up, and each file may hold about 110 records (based on a typical 5 field record).

The disc version allows up to 17 fields per record, and the only limitation as to the number of records, is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100k disc.

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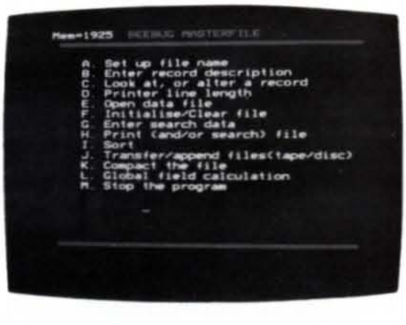

```
Mem=1925  BEEBUG MASTERFILE

      A. Set up file name
      B. Enter record description
      C. Look at, or alter a record
      D. Printer line length
      E. Open data file
      F. Initialise/Clear file
      G. Enter search data
      H. Print (and/or search) file
      I. Sort
      J. Transfer/append files(tape/disc)
      K. Compact the file
      L. Global field calculation
      M. Stop the program
```

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TOOLKIT is an indispensable aid to Basic programming on the BBC Micro. It gives instant access to a set of powerful utilities held in ROM.

These will get you out of trouble like the *RECOVER, or just make life much easier, like automatic listing of error lines, search and replace, list variables, procedures . . . etc.

TOOLKIT features an extremely powerful editor, allowing the use of cursor keys to list a program line-by-line in either direction and move to any part of a program to overtype or insert new code and corrections.

TOOLKIT also contains a powerful facility to trap an error in a Basic program as it runs. It will then automatically enter the Screen Editor, display the line in error and position and cursor at the statement at fault.

COMMANDS	
***CHECK**	Verify a program or data in memory with disc/cassette.
***CLEAR**	Clear all variables including integers.
***EDIT**	Enter full screen editor.
***FREE**	Display free memory and pseudo variables
***HELP INFO**	Displays various useful system information.
***MEMORY**	Display memory contents.
***MERGE**	Merge two programs.
***MOVE**	Move program to run at specified address.
***NEW**	As New, but can be issued from within a program.
***OFF**	Cancel enhanced error handling.
***OLD**	As Old, but can be issued from within a program.
***ON**	Auto error handling – enters editor at line in error.
***PACK**	Efficient program compactor.
***RECOVER**	Intelligently recover bad programs.
***RENUMBER**	Allow partial renumbering.
***REPORT**	Extended error reporting facility.
***SCREEN**	Screen dump to cassette or disc.
***UTIL 1**	String Search.
***UTIL 2**	String Search and Replace.
***UTIL 3**	Move Basic program lines.
***UTIL 4**	List Procedures and Functions.
***UTIL 5**	List values of A% to Z%.
***UTIL 6**	List Numeric Variables.
***UTIL 7**	List String Variables.
***UTIL 8**	List Names of Arrays.
***UTIL 9**	Set up range for Utilities 1 and 2.

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- 27 new commands to make life easier
- Saves hours in program development and debugging
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- No command name conflict with other Roms
- Ideal for expert and novice alike
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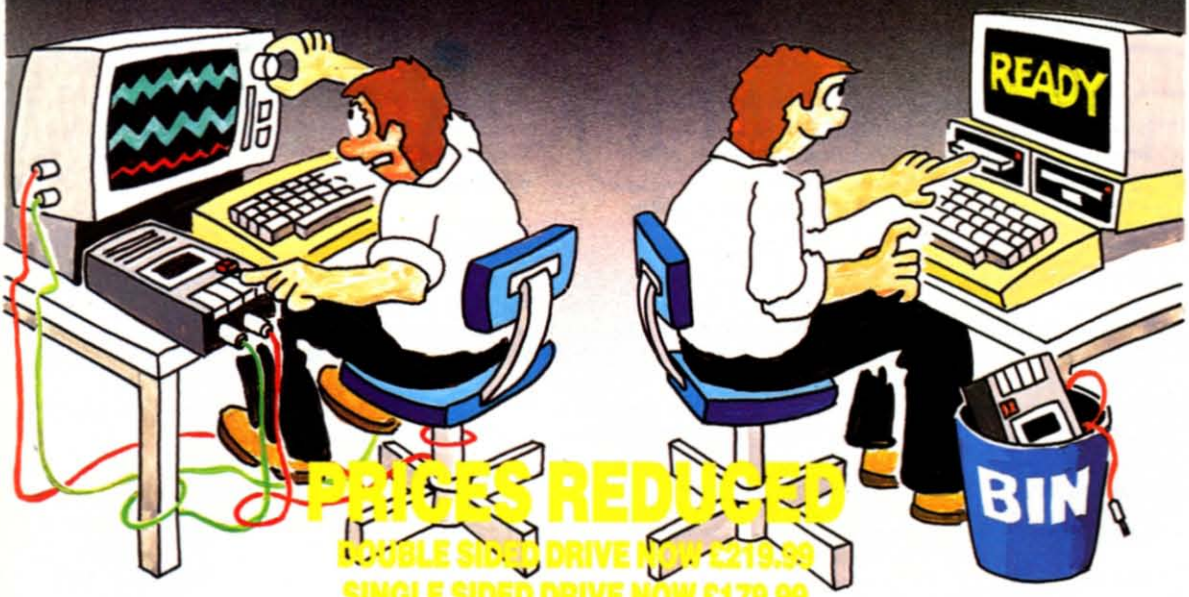
Cassette users can read this while loading a program



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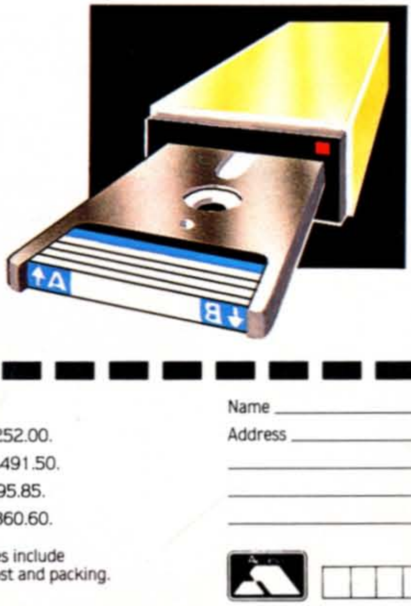

SPECIFICATIONS Track to track access time is 3 ms. Data transfer rate 125 Kbs^{-1}. Dual double sided Disc drives give 1 Megabyte of on-line storage.

TERMINOLOGY GUIDE

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From Page 104

standard Model B BBC Micro.

This is the RS423 port, and it provides the first link in the communications chain.

The reason for using the RS423 serial port, as opposed to a parallel port such as that used with Centronics-type printers, is fundamental to the whole area of long distance transmission of data.

Since the telephone network uses only two, three or four wire circuits, data must be transferred in serial form, one bit at a time, in sequence.

However data within a computer is transferred between different components in parallel. This means that in an 8 bit machine such as the BBC Micro, eight individual wires, known collectively as the data bus, are used to move information around a byte at a time. This is termed parallel transfer because eight bits are transferred simultaneously.

We have noted that the primary reason for serialising data for transmission over the telephone network is simply that there are insufficient wires to transmit eight bits at a time.

Indeed, it would be extremely expensive to lay eight cables instead of one, and even if this were possible there are further complications with respect to parallel data transfer.

These revolve around the fact that the individual bits of data tend to travel at different speeds within the wires and introduce what is known as data skew. The result is that the data becomes garbled.

This effect, illustrated in Figure I, is more noticeable over greater distances. It is one of the reasons that data cables used with parallel printers, or disc drives, are rarely longer than about a metre.

We see then that the function of a serial interface is to convert data from a computer into serial form so that it may be transmitted via a circuit consisting of as little as two wires.

The parallel transfer of n data bits requires n+1 individual wires, n wires for the data and one ground line.

In addition to the obvious economies of using fewer wires, serial data may be transmitted over longer distances than is possible with a parallel interface due to the absence of the skew effect in serial circuits.

What are the other components of a communications system?

Consider the type of signals that a computer generates. These are digital in nature. The 1s and 0s are represented by two separate and distinct voltage or current levels, generally the former.

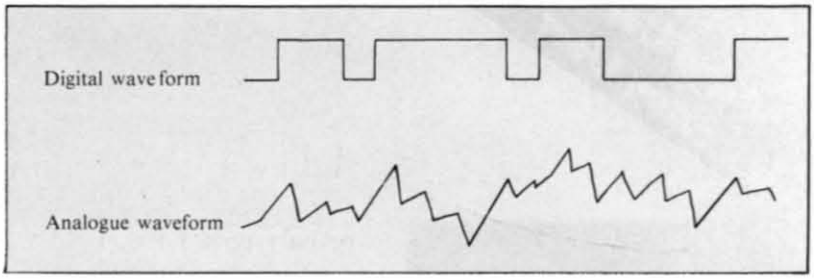

Figure II: Analogue and digital waveforms

The public telephone network however was developed for a different application – the transmission of the human voice which is analogue, as opposed to digital, in nature.

The difference between the two types of signal, analogue and digital, can be seen in Figure II.

The point is that the square waveform produced by digital computers will not pass through the telephone network because of the nature of the network itself and various filters and switching equipment used in telephone exchanges.

To overcome this problem a further piece of equipment is required that will convert digital data into analogue form so that it can then be transmitted via the telephone network.

This task, termed modulation, is the function of a modem.

In practice a modem carries out two jobs. Digital data for transmission is modulated into analogue form before being passed to the telephone system. Conversely, received analogue data is demodulated into digital form before being given to the computer.

Hence a modem is used to both *MO*dulate and *DEM*odulate electrical signals.

The final element involved is the software.

The facilities offered by communications software may vary greatly, but essentially it provides the means by which the serial interfaces, and the data passed between them, can be controlled.

Just as a disc filing or disc management system is used to store and retrieve information from disc, communications software may be regarded as the communications management system.

Thus, although the hardware provides the physical means by which data and files can be transferred, some form of protocol is required in order that each computer can understand and use the signals it receives from the other.

These protocols may be regarded as the equivalent of word, sentence and paragraph structure in a spoken language.

In the case of written text punctuation is used in order to ensure that it makes sense to the reader. Similarly a protocol structure of some form is required to allow two computers to communicate sensibly with each other.

It is the software that provides this structure, along with the facilities for storing and manipulating received data or data to be transmitted.

So we can see that three basic elements, apart from the computer, must be present in a communications system using the telephone network – a serial interface, a modem and the appropriate software.

On a smaller scale, within a particular room for example, it is perfectly possible to link the two computers together without using the telephone system.

In this case a direct wire link between the two serial interfaces is sufficient to allow communication to take place and no modulation is required. Provided that the distance between the computers is not too great there should be no problems.

Using a hard-wired link in this way, however, reveals a further advantage of using the telephone system.

When a hard-wired connection is used only the two computers involved can communicate with each other. The telephone system, however, offers far greater flexibility in that any two computers with access to a phone may be linked.

As we have said, the BBC machine itself is supplied already equipped with an RS423 serial interface. The connector for this is located on the rear of the machine and provides a 5 pin domino socket into which the lead from a suitable modem can be plugged.

Modems themselves may be obtained with various levels of sophistication, ranging in price from as little as £70 to several hundred pounds.

Finally, there are a number of software packages available for the BBC Micro to suit the needs of almost any application.

Communication between it and almost any other type of mainframe, mini or micro is possible, so give it a try.

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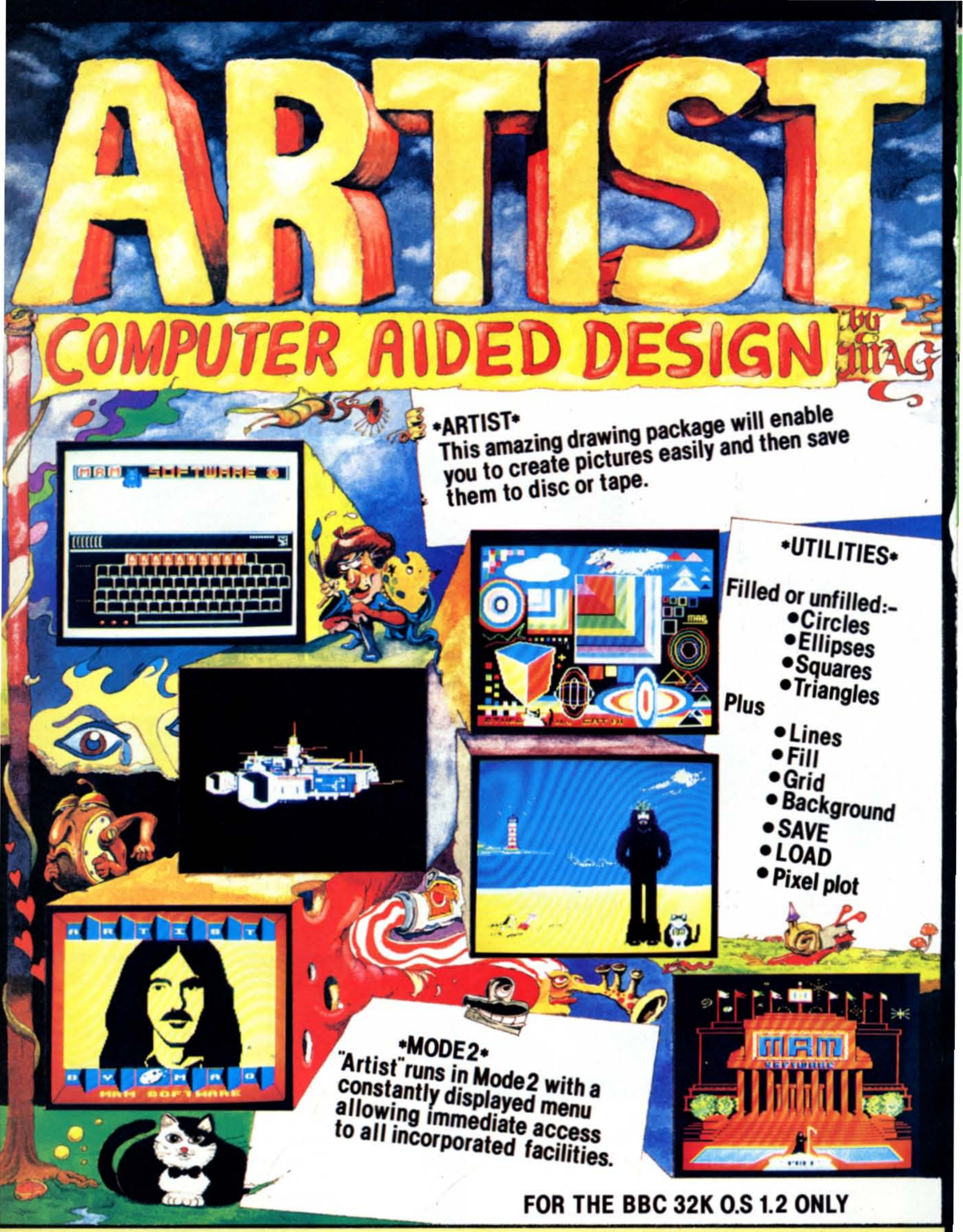
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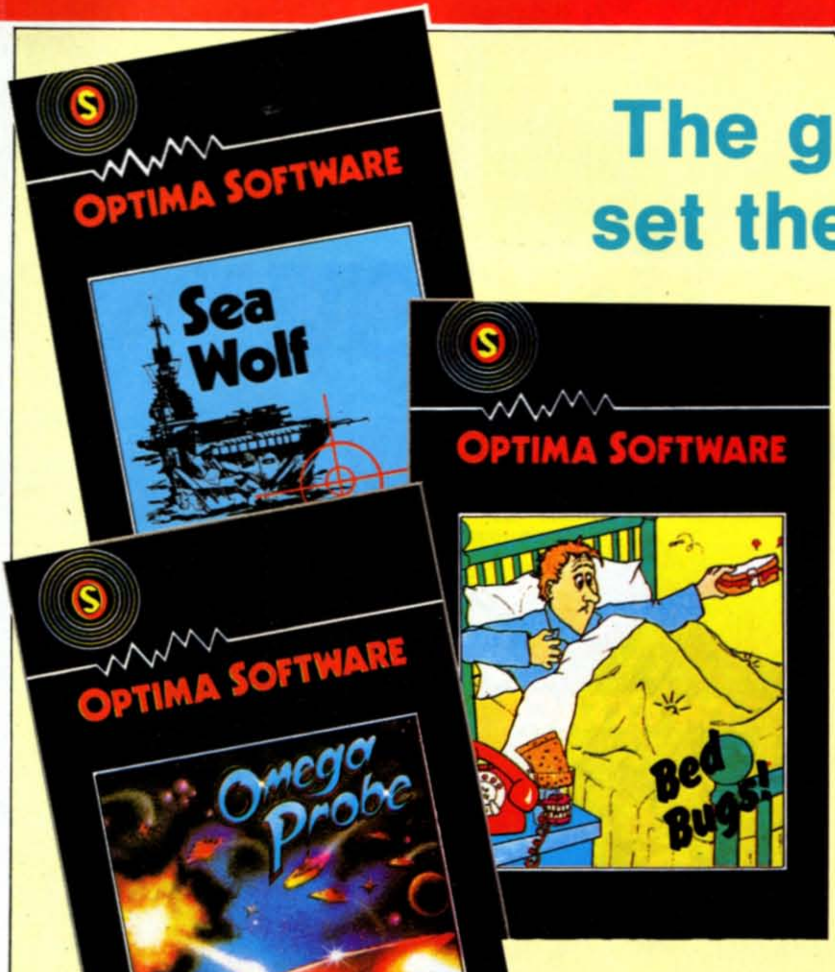

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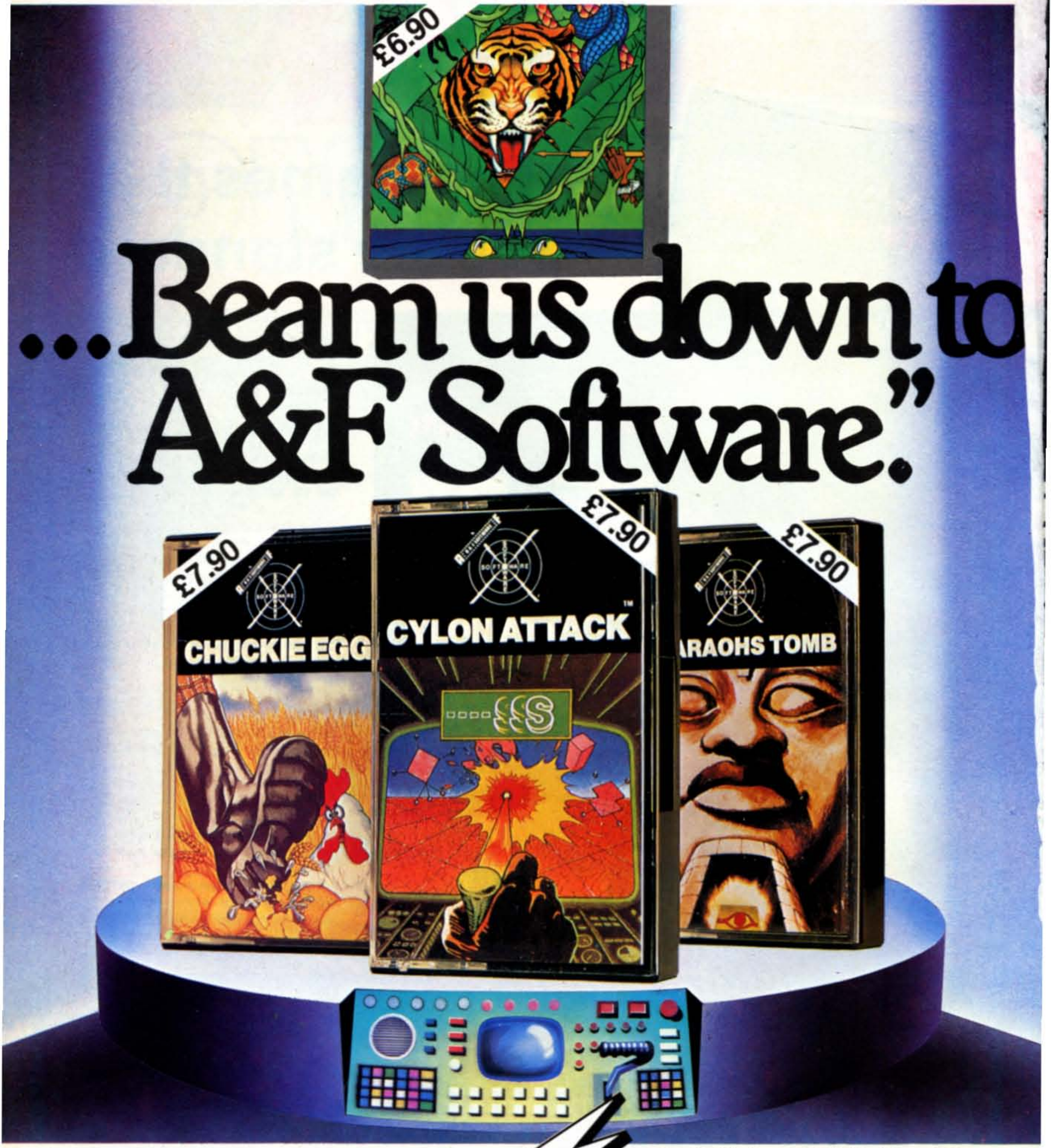
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THE BEEB BODY BUILDING COURSE

PART 16

MAKE A MODEM

Then you can get out and meet people

By MIKE COOK

THE trouble with computing is that it seems to be such a solitary task. You never get out to meet people.

Well that can be an advantage at times, but there is no denying the stimulation of contact with other machines – er . . . I mean people.

So it struck me as a good idea to produce a do-it-yourself modem to allow computers to communicate over the phone line.

By a coincidence, when the project was well underway the editor came in and demanded "something to do with communications" in his usual eloquent way. So hopefully everybody is happy.

Modem is a word coined from Modulator/Demodulator and is used to convert serial data into audio tones. These can then be sent down a telephone line and received at the other end. The receiving modem then converts the tones back into serial data.

This is very much like the cassette interface on the BBC Micro, only the frequency of the tones is different.

The tone is known as the carrier, as it carries the information or data. The data is said to modulate the carrier. The two main types of modulation are achieved by varying the amplitude or frequency of the carrier.

Amplitude Modulation, or AM as it is known, makes the size or amplitude of the carrier vary with the data. This is used in medium and longwave radio transmissions.

Frequency Modulation (or FM) changes the frequency of the carrier with the data. This is used on VHF (Very High Frequency) radio transmissions.

It is also the method used by a modem. So let's look at it a little more closely.

If we have a single steady tone, as shown in Figure Ia – which is a plot of amplitude against time – it will contain, as you might expect, only one frequency.

This can be shown as a single line in a plot of amplitude against frequency, as shown in Figure Ib.

These two ways of representing a signal are known as the time domain and frequency domain. The frequency domain is very useful because it allows us to see all the frequencies involved in any particular situation.

This is important as whenever we send information over any channel the frequency range that the channel can carry is restricted.

This is known as the bandwidth of the channel.

As you can see, if we want to transmit just a single steady tone we do not need much bandwith at all. However if we have two tones then we need a bandwidth wide enough to accept both tones (see Figure Ic).

When we switch between one tone and the other this creates frequencies other than the two tones for the brief instant of the switching.

The faster the switching, the more of these transient signals are generated. I could do the maths to prove it but I think you're better taking my word for it.

When we plot these transient signals in the frequency domain we find that they spread out either side from the two tones. Thus the bandwidth needed to carry these tones increases as the switching speed increases.

In a serial data system this switching speed is governed by the baud rate of the data. So the faster the baud rate the larger the bandwidth needed.

Telephone circuits were only designed to cope with the spoken word. This is why their bandwidth is limited to a size just lower than is needed to do that properly. Hence the fact that we all sound slightly different on the telephone.

British Telecom is also rumoured to have an accent intensifier circuit built in

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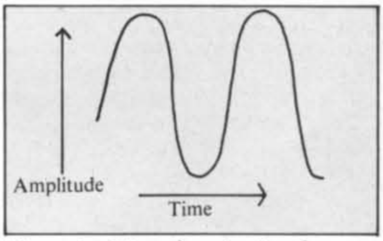

Figure Ia: Time domain signal single tone

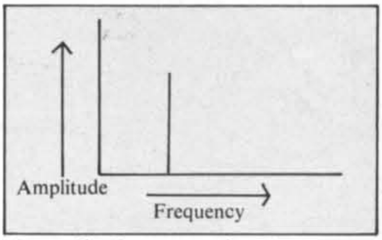

Figure Ib: Frequency domain signal single tone

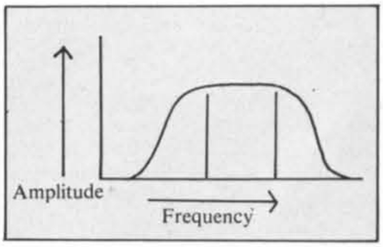

Figure Ic: Two tones and the bandwidth required for them

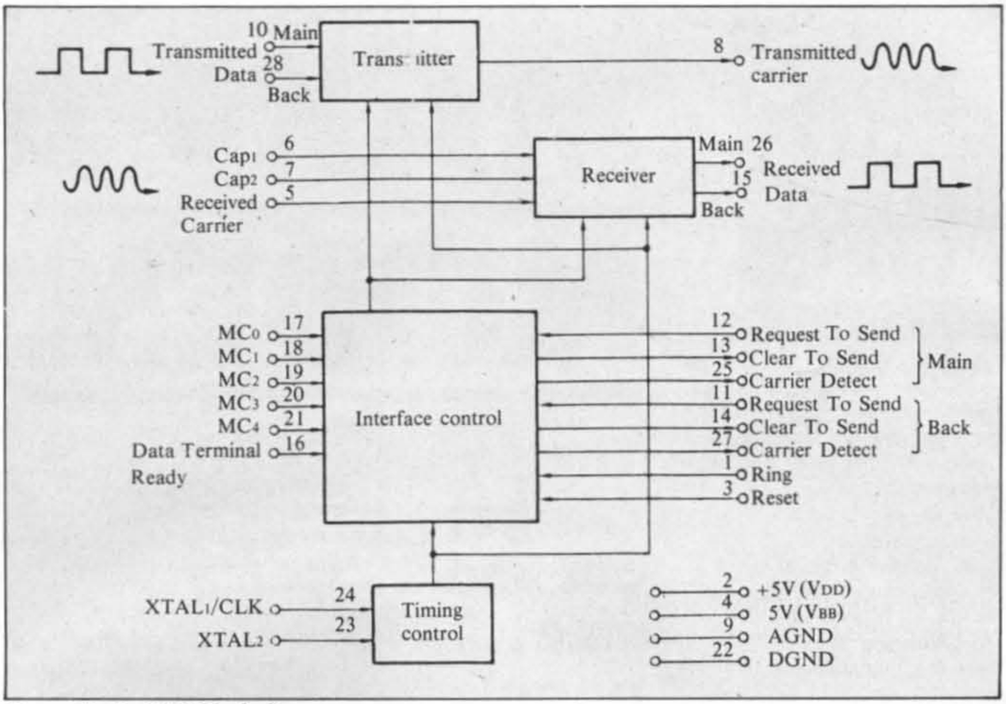

Figure II: Am7910 block diagram

From Page 115

to the phone system so that those in the home counties can instantly tell what part of the country they are phoning.

Fortunately that does not interfere with the transmission of data, but the limitation on bandwidth does.

The bandwidth of a telephone circuit is about 3KHz, which restricts the data rate to a maximum of just over 1200 baud.

It should be noted that this is the maximum data rate the phone line can handle. So if you want to use this rate you can only do so in one direction.

This "one way street" type of communications is known as half duplex.

If you want to have a two way link over the telephone then you need two tones to transmit and two different tones to receive. These tones need to be separated by a large amount to prevent your transmitted tones interfering with your received tone.

The net result of this is that the data rate drops to 300 baud if you want a two way or full duplex link.

To further complicate matters the two stations have to send different tones, as one station's transmit tone is the other's receive tone. Depending upon which tones you transmit, you are known as the originating or the answering terminal.

Basically, by convention if you ring someone up you are the originator and the other end is the answerer.

Now the only thing everybody has to agree on is what frequency tones to use. There is a world standard laid down by CCITT.

The initials stand for International Communications Telephone and Telegraph Conference, but as it is in French, like all French thinking, it comes out back to front (just like VAT).

This standard is used throughout the world with only one country being an exception. Unfortunately that country is the United States of America and so cannot be ignored.

They have their own standards laid down by the Bell telephone company. So full duplex communication uses the Bell 103 standard in the USA or CCITT V21 standard in the rest of the world.

If you want one way communication at maximum speed then the CCITT V23 or Bell 202 allows this. Prestel uses the V23 standard to send information to you very quickly.

You have to reply to it, but as you have very little to send it they have squeezed a low capacity backwards or back channel into the standard.

This allows Prestel to send to you at 1200 baud and allows you to talk to Prestel at 75 baud. The back channel also uses two tones but of quite low frequency.

The Bell 202 also has a back channel but this is done by switching a tone on or off. This means there is only enough bandwidth to work the back channel at 5 baud. As this is the case it is not compatible with the BBC Micro.

Normally when using half duplex the back channel is not used and control codes tell the terminal whose turn it is to talk. This is rather like saying "over" when using a radio transmitter.

As you can guess, with lots of different standards you are faced with the problem of whether to design a modem which uses just one standard and make the electronics cheap and simple, or to cover them all, along with the associated complications.

Fortunately there is an intermediate solution in the guise of the Am7910 world-chip. This single, but expensive, device includes most of the functions needed to implement a modem.

Unfortunately in "one off" quantities they cost over £32 each. But when you compare that with the electronics you would need to make just a single standard modem it is very favourable.

Compared to a multi-standard modem it is positively a bargain.

So this month we will see how to use this chip to make a multi-standard acoustic coupled modem.

The best type of modem is one where a direct connection is made to the telephone circuits. But British Telecom requires these to be manufactured, not kits, and the modem needs to be "type approved".

This is to ensure that their engineers are not endangered by any twit putting high voltages over the phone network.

Unfortunately type approval costs a lot of money – around £4,000 – and takes forever. Usually that means about three years, or until you have gone out of business.

To further complicate matters the regulations also include very nonsensical restrictions and standards, dreamed up by a super bureaucrat on one of his better days.

One example is that the lettering on the panel has to be a regulation size and style and must withstand 20 rubs with a damp cloth and 10 rubs with a meths moistened rag.

And if the spelling is changed then type approval has to be sought again.

As another example of the mentality of the sort of person who writes these regulations, the specifications for Prestel, which is like Mode 7, refers to the block graphic characters as "mosaic characters". It took me a long time to understand just what that meant.

It strikes me that anyone who could write that must have a degree in classics from one of the prime civil servants breeding grounds, oops, universities.

With an acoustic coupler, the headset of the telephone is placed close to a loudspeaker and microphone and so there is no direct connection into the telephone circuits.

This involves several minor inconveniences, such as being able to hear the tone while you are using the modem. This "feature" will constantly reassure you that your circuit is working.

Also you may get acoustic interference which can corrupt your characters as they are echoed back. But this can be overcome, as we shall see later.

The outstanding feature of the Am7910 chip is that it performs all the filtering functions on the chip. This is done by a digitally switched capacitor.

This technique is quite complex and is best left until we can devote a whole article to it. Suffice to say that it is very easy to make variable frequency filters using this technique.

The chip also contains the circuitry needed to modulate and demodulate the signal.

All we need to do is to hang around it a few extra components and some circuitry to handle the microphone and loudspeaker and the conversions between TTL logic levels and RS423 levels.

Figure II shows the block diagram of the chip. It has some functions that we will not need, such as a $\overline{\text{RING}}$ input to allow it to go into the correct sequence for automatically answering an incoming telephone call.

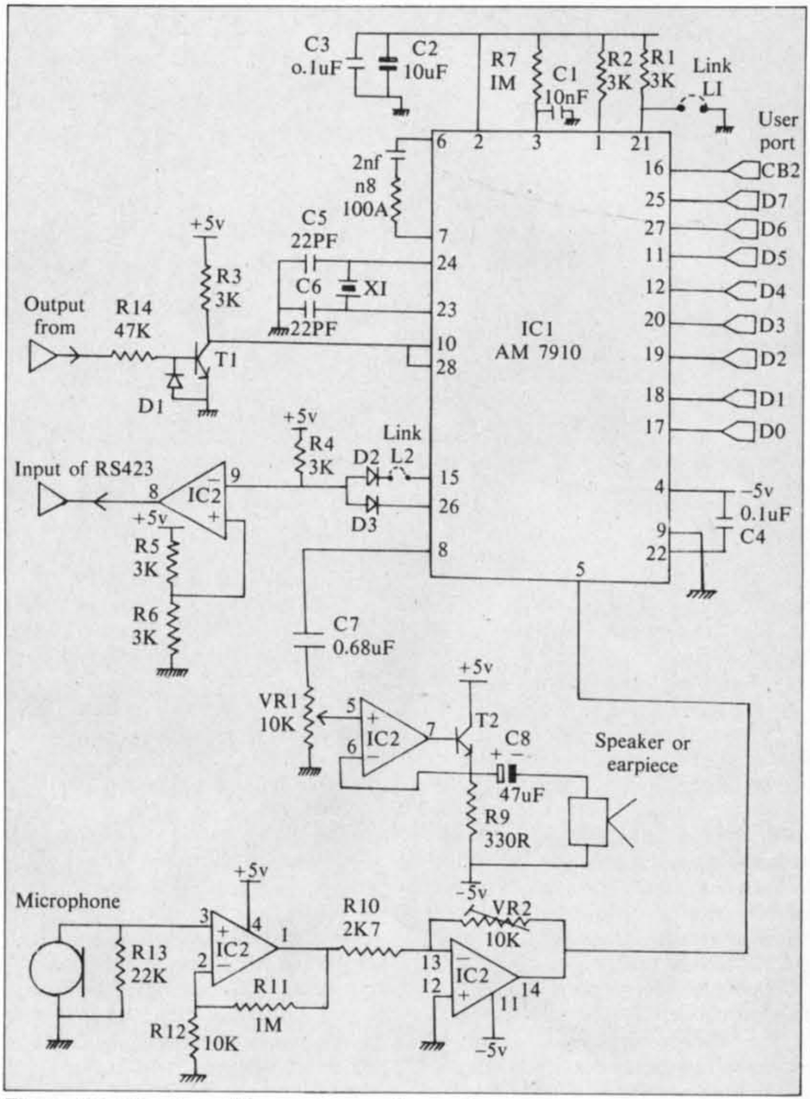

Figure III: Circuit on the acoustic coupier modem

There are signals for both the main and back channels and, as the BBC Micro has only one RS423 input, we will need to combine these to give us maximum flexibility.

There are also a number of mode control lines which can either be switched by mechanical switches or can be connected to the computer so that the software controls the modem standard.

You will see that there is only one transmitter (tone generator) for both channels – the $\overline{\text{RTS}}$ (request to send) or the $\overline{\text{BRTS}}$ (back request to send) controls which one is switched through when a V23 mode is selected.

The bar you see over some of the signals indicates that the lines are active low. That means a logic zero is needed to implement the function.

Therefore you are making a request to send data when the $\overline{\text{RTS}}$ line goes low.

Figure III shows the circuit for this month's project and is quite straightforward.

The microphone is amplified by two operational amplifiers, the second having a variable gain to allow you to adjust the sensitivity.

The audio tone produced by the chip is fed to a loudspeaker via an amplifier to control the loudness.

You will notice that a transistor has been included in the feedback path of the amplifier to reduce the output impedence, as the loudspeaker has only got an 8 ohm impedance.

Another operational amplifier is used

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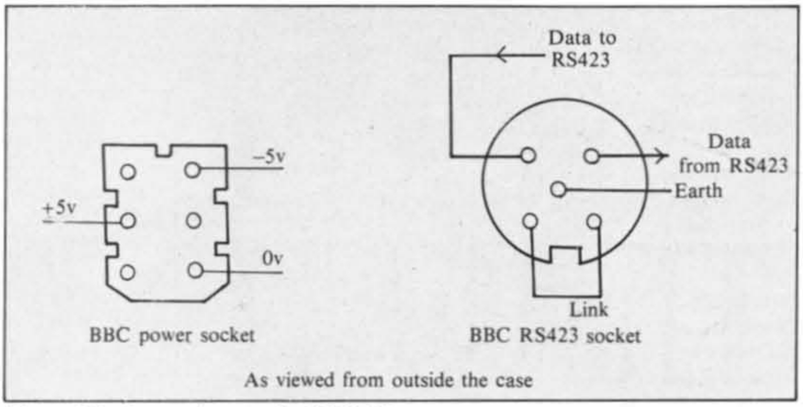

Figure IV: Connections to the BBC Micro

From Page 117

to convert the TTL received data output into RS423 levels. As this can come from the main channel or the back channel they are mixed together using two diodes.

It works by acting as a threshold detector as well as inverting the signal. A single transistor converts the incoming RS423 signal into TTL levels.

The mode lines are connected to the user port as well as the $\overline{\text{RTS}}$ and $\overline{\text{BRTS}}$ lines. These can then be directly switched from the software.

The lines indicating that a carrier has been received on the main and back channels are also connected to the user port. This is useful as it indicates whether you have fitted the telephone handset correctly.

The "data terminal ready" signal is an enable line for the whole chip. This is driven from control line CB2 on the user port as it can be made to act as a single steady output. It also reverts to an input and thus "floats high" when the Break key is pressed.

The circuit is powered from the auxiliary power socket. This is because the modem chip requires a –5V supply at a current of about 20 mA. This is too much to generate using a negative supply generator circuit like that used in the fast A/D converter described in the March, 1984, issue of *The Micro User*.

Those of you with the older "black" power supply must make an external supply or tap into the computer's own supply with wires. As only very light current is drawn it will be able to stand this.

Remember the –5V can be got by soldering a wire onto the spade terminal on the main board, the one with the purple wire at the left hand edge of the board.

The +5V can be pinched from any of the other three spade terminal pairs. As I said, if you have an auxiliary power socket (and are not using it for discs) there is no need to do this.

When developing this design I came across one of those head-scratching problems that had me stumped for some time.

The circuit worked perfectly when driven from my bench power supply but when connected up to the BBC Micro's supply it refused to function.

Suspecting the trouble was the slightly lower voltage available from the BBC Micro (4.75 volts), I included a voltage regulator and drove it from the 12 volt output. The result was still the same – it would work from the bench supply but not from the micro.

I eventually found the trouble. It was that the rise time on the BBC Micro's power supply was faster than that of the bench supply.

As a result the crystal oscillator attached to the chip did not start up properly. I managed to get it to work by altering the capacitance values around the crystal.

A printed circuit is supplied in Body Build Pack No. 14 as well as all the other electrical components needed to build the modem.

You will also need a user port ribbon cable connector like that in Body Build Pack 2 or similar.

As usual, assembly of the printed circuit should present no difficulties, as a component reference pattern is printed on the board. However, make sure the transistors, diodes and ICs are the right way round.

The power lead should be made up by clamping the wires in place by bending over the flanges on the pins and then soldering them. They should be pushed in from the back of the shell and the barbs on them will keep them in.

Figure IV shows the positions to use along with the 5 pin DIN socket. This socket should have two of its connections shorted by a small length of wire inside the plug shroud.

You should note that this can be plugged into the BBC Micro in two ways. The correct way is with the gap in the metal shroud at the top.

If you are not so hot with a soldering iron the electronics can be supplied ready built-up, and you will just have to construct the acoustic coupling device.

In any commercial device it is the mechanical components of a design that really push up its cost, and so it is here that we can make most savings.

In particular, you need to construct the acoustic coupling device. This is needed to hold the microphone and loudspeaker close to the telephone and to shield them from any extraneous noise.

Exact details will vary depending upon what style of telephone handset you have. I have the traditional type, so I will describe what I did.

First I obtained some inch and a half thick stout foam rubber. Then I cut out two 4 inch diameter circles and cut the rest into 6 inch long strips an inch and a half wide.

Then I held these strips around the telephone earpiece with string. This foam was then glued onto the foam circles.

I tried various different types of glue and found that silicon rubber sealant – the type used for around baths – worked very well but had to be left overnight to set.

I would recommend the use of one of the new hot melt glue guns. The flexible adhesive is ideally suited for foam rubber.

With the foam cups now tailor-made for your handset you can use a hot iron to burn out a small recess for the microphone and loudspeaker to sit in.

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I suggest you do this outside as the fumes given off are guaranteed to be both toxic and annoying to your wife, girlfriend or mother (female readers please substitute the appropriate male gender).

The parts can then be fitted in this recess and odd strips of foam glued in place to complete the construction.

A more aesthetic look to the cups can be achieved by trimming the corners with a large pair of scissors.

Now you can either fit elastic on each cup so that it will not fall off the handset when in use, or can make a mount. This latter can be constructed easily from a piece of aluminium or even stout cardboard. Figure V shows the general arrangement.

The foam cups can then be glued onto this to make a secure handset.

This is only one way of tackling the mechanical construction, and I am sure other readers will come up with their own ideas.

As you can appreciate, this foam construction cannot be supplied readymade. However it is not too difficult to do. What matters is its function, not how it looks.

Having built the modem it is time to test it.

On the board you will find two links. Link L1 will put the modem into "Loop back mode" when it is removed. This means that the transmit and receive frequencies will be the same.

You can then put the microphone next to the loudspeaker and verify that it works. This will be proved when everything you type is echoed back on the screen.

You can test out all the modes in this way.

However when Bell 202 is selected the link L2 must be removed as in this mode the back channel output is set to a logic zero, thus stopping any main channel output from being sent.

When testing the prototype I found that some loudspeakers could not follow the frequency changes rapidly enough to send the data. Best results were obtained with an earpiece insert, the sort that is in the phone already.

However I suspect that some of the small tweeter loudspeakers would work just as well.

The program given in Listing I will make your micro act as a dumb remote terminal for contacting bulletin boards and the like.

It can be used directly for V21 originate operation, but it also offers the facility of changing the mode of operation to any supported by this chip.

The program also illustrates how to control the modem with software.

A list of telephone numbers is displayed on the screen. These are all numbers I have successfully contacted with this acoustic coupler.

The program is written in such a way as to allow you to insert extra numbers in data statements before line 1170. This line contains two null strings which inform the program it has come to the end of its list.

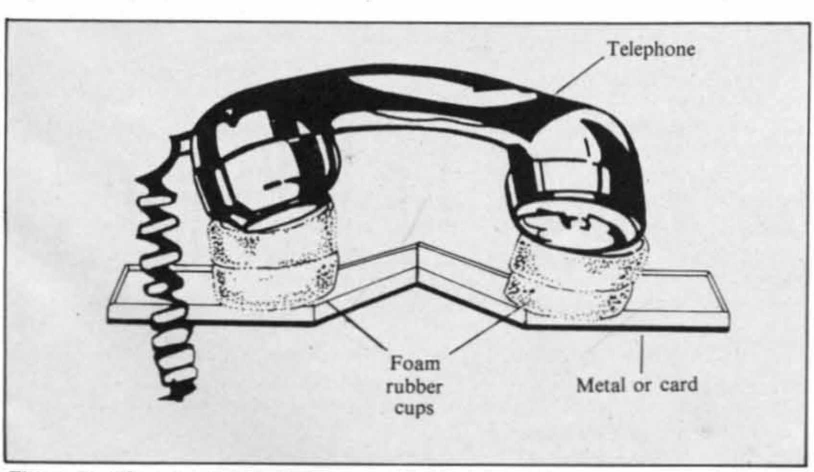


Figure V: The acoustic coupler

You should then dial the number and press a key. When you hear the tone from the other end place the handset into the foam cups (get it the right way round).

You should then see a message at the bottom of the screen saying "CARRIER DETECTED". This is tested for by line 470, which looks at the carrier detected signal from the modem chip.

The program then clears the screen and flushes the buffers and goes into a machine code routine called TERM. This simply scans the RS423 input buffer and, if it finds a character in it, displays it on the screen (providing it is not a control character).

The only control characters to get through this net are a line feed and a carriage return. This is to stop any corrupted characters from changing modes or doing anything nasty with the VDU control codes.

Any keys pressed will be transferred to the RS423 output buffer and sent.

Two control codes, however, will be trapped and not sent. These are the codes that turn the printer on and off. Thus you can control the printer in the normal way and get a hard copy of what is being sent to you.

For testing or changing modes the C key will give you a menu selection of all available modes.

If you select a half duplex mode you will be asked if you are going to send or receive. This will allow the correct setting of the RS423 baud rates and set a variable so that $\overline{RTS}$ or $\overline{BRST}$ is asserted as appropriate.

If you are in loop back mode then the baud rates for transmit and receive will be set at the same rate.

In the Standard V23 Mode 1, a 600 baud rate is used. This is not supported by this program as it is not directly available from the BBC Micro.

I believe this speed can be achieved by dint of a few tricks, but I have not looked into it yet because I know of no system that uses it.

You are then asked for the word format required. This is a function of the serial ACIA chip inside the BBC Micro and no others are available.

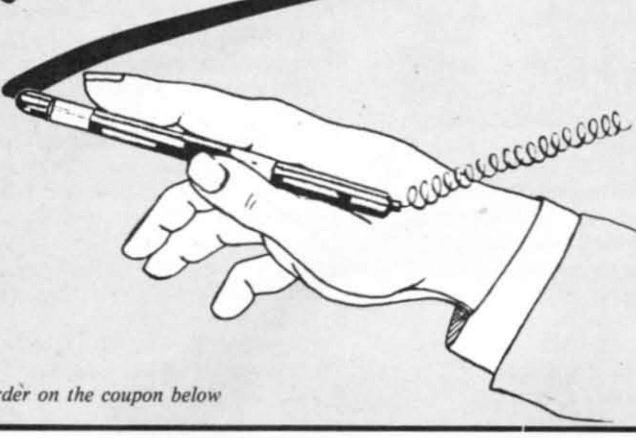
When that is selected you are asked what screen mode you want to use. The program then continues as before.

Note: *If you have selected Bell 202 mode remember to remove link 2.*

You will see that some modes are given with and without equalisation.

→

Make light work of it



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From Page 119

Normally you should select the mode without equalisation.

Equalisation is usually only needed to compensate for very long telephone wires found abroad. By all means try it, but I found it gave inferior results.

This software is not sufficient for connecting to the Prestel system as, despite the claims that the standard is the same as Mode 7, there are lots of differences which have to be programmed around.

I have only tried out the circuit "in anger" on 300 baud V21 systems, but all the other modes check out with loop back tests.

The two potentiometers should be adjusted so that a minimum amount of noise is emitted from the speaker. This will reduce the strength of the transmitted signal in the received circuit.

If this is a problem you could try reversing the wires going to the loudspeaker or microphone. This would change the phase of the signal and might give a little immunity to transmitted carrier interference.

Turn the microphone gain control up until reliable copy is obtained. If you make it too sensitive you can have trouble with acoustic interference.

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I found out about this when testing the prototype. It would work fine if I typed slowly, but if I typed rapidly I would get errors.

However when the remote terminal played me back my own message it had been received all right.

The trouble was that the clatter of the keys was being picked up by the microphone and was corrupting the incoming echoed-back character.

Shifting the modem off the table the computer was on reduced this considerably.

Having completed this project you should be able to leave a message for me on *The Micro User* Bulletin Board. I look forward to hearing from you.

Happy hacking.

Body Build Pack No 14 contains: 1 printed circuit board; 1 28-pin IC socket; 1 14-pin IC socket; 1 20-way IDC header; 2 Link posts and shorting sockets; 1 microphone insert; 1 earpiece insert; 1 5 way DIN plug; 1 power supply plug; 2 yd 4 core cable (for power and RS432 lead); 4 yd miniature screened cable (for microphone and cable); IC1 Am7910 World-chip; IC2 LM324 quad op amp; Tr1-2 BC337; D1-D3 1N4148 diode; X1 2.457 MHz crystal; VR1 VR2 10 horizontal preset pots; R1-R6 3K; R7 & R11 1M; R8 100R; R9 330R; R10 2K7; R12 10K; R13 22K; R14 47K; C1 10nF polyester; C2 10uF Tant; C3 C4 0.1uF Disc ceramic; C5 C6 22pF ceramic; C7 0.68uF polyseter; C8 47uF Electrolytic.

Beeb Body Building Course listing

```
 10 MODE 7
 20 PRINT TAB(0.5);"THE BEEB BODY
     BUILDING COURSE"
 30 PRINT "JUNE 1984"
 40 PRINT "By Mike Cook"
 50 PRINT "ACOUSTIC COUPLER MODEM"
 60 PRINT
 70 PRINT
 80 PRINT "PRESS ANY KEY TO START"
 90 A%=GET
100 REM SET USER PORT
110 RTS=&EF
120 M%=3
130 ?&FE62=&3F
140 *KEY 10 OLD|M
150 CLS
160 T%=10
170 DIM N$(T%),WHO$(T%), CODE%
     255
180 *FX7.3
190 *FX8.3
200 PROC_TERM
210 REM SET FORMAT TO 8 BITS NO
     PARITY
220 ?&80=&14
230 CALL RINT
240 REM SELECT V21 ORIGINATE
250 ?&FE60=&F4
260 N%=0
270 PRINT
280 PRINT "300 BAUD DUPLEX TERMINAL"
290 PRINT
300 PRINT "Numbers to remember are:-
    "
310 PRINT
320 REPEAT
330 N%=N%+1
340 READ N$(N%),WHO$(N%)
350 UNTIL N$(N%)=""
360 N%=N%-1
370 FOR A%=1 TO N%
380 PRINT " ";A%;" - ";N$(A%);"
     ":WHO$(A%)
390 NEXT
400 PRINT
410 PRINT "Press C to Change Standar
    d"
420 PRINT "Any other key to continue
    "
430 A$=GET$
440 IF A$="C"
    THEN PROC_STANDARD
450 PRINT "PRESS A KEY WHEN CONNECTI
    ON IS MADE"
460 REM ACTIVATE MODEM CHIP
470 ?&FE6C=(?&FE6C AND &1F)
    OR &C0
480 REPEAT
490 A%=?&FE60 AND &80
500 IF A% = 0
    THEN PRINT TAB(0,22);"CARRIER
     DETECTED"
    ELSE PRINT TAB(0,22);SPC (18)
510 A$=INKEY$ (0)
520 UNTIL A$<>""
530 REM SEND TONE - DROP RTS OR
     BRTS
540 ?&FE60=?&FE60 AND RTS
550 *FX21,1
560 *FX21,2
570 *FX2,2
580 MODE M%
590 CALL TERM
600 END
610 DEF PROC_TERM
620 OSBYTE=&FFF4
630 FOR A%=0 TO 3 STEP 3
640 P%=CODE%
650 [
660 OPT A%
670 .RINT
680 LDA #156
    :LDY #&E3
690 LDX &80
700 JSR OSBYTE
```

→

THE BEEB BODY BUILDING COURSE

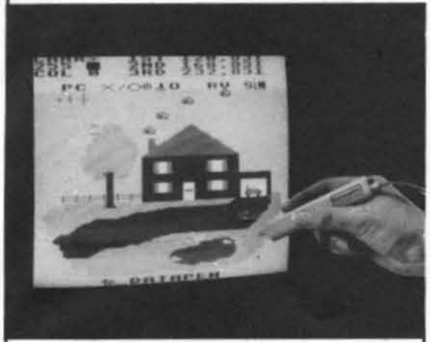
From Page 121

```
710 RTS
720 RTS
730 .FISH
740 LDX #1
750 LDA #145
760 JSR OSBYTE
770 RTS
780 .TERM \ DISPLAY WAHT COMES
     IN
790 JSR FISH \ ANYTHING COME IN?
800 BCS SEND \ BRANCH IF NOT HING
810 TYA
820 CMP #32
830 BCS SHIFTUP \BRANCH IF NOT A
     CONTROL CODE
840 \PROGRAMMED ACTION ON CONTROL
     CODES
850 CMP #13
860 BEQ DISPLAY
870 CMP #10
880 BEQ DISPLAY
890 JMP TERM \ ALLOW NO MORE CONTROL
     CODES
900 .SHIFTUP
910 .DISPLAY JSR &FFEE
920 .SEND
930 LDX #0
940 LDA #145
950 JSR OSBYTE \ANYTHING TO SEND?
960 BCS TERM \BRANCH IF NOT
970 CPY #02 \ IF IT IS A COMMAND
     TO TURN PRINT ER ON
    THEN DO NOT SEND
980 BNE SK1
990 .DIR TYA
1000 JMP DISPLAY
1010 .SK1 CPY #03 \ IF IT IS A COMMAN
    D TO TURN THE PRINT ER OFF
    THEN DO NOT SEND
1020 BEQ DIR
1030 LDX #2
1040 LDA #138
1050 JSR OSBYTE \SEND IT
1060 JMP TERM
1070 ]
1080 NEXT
1090 CLS
1100 ENDPROC
1110 REM PHONE NUMBERS
1120 DATA "061 456 4157","THE MICRO
     USER"
1130 DATA "01  679 1888","DISTAL"
1140 DATA "0702 552941 ","MAPLIN"
1150 DATA "051 428 8924","MAILBOX-80"
1160 DATA "04862 25174 ","CBBS-SURREY
     "
1170 DATA "",""
1180 DEF PROC_STANDARD
1190 DIM ST$(8,1),WF$(7),HALF%(8)
1200 CLS
1210 PRINT TAB(0,1);"Modem standards
      are:-"
1220 FOR A%=0 TO 8
1230 READ ST$(A%,0),ST$(A%,1),HALF%(A
     %)
1240 PRINT ;A%;" - ";ST$(A%,0)
1250 PRINT TAB(4);ST$(A%,1)
1260 NEXT
1270 PRINT
1280 PRINT
1290 REPEAT
1300 PRINT "CHOOSE WHICH YOU WANT"
1310 N%=GET AND &0F
1320 UNTIL N%<10
1330 CLS
1340 PRINT TAB(0,3);"MODEM STANDARD"
1350 PRINT
1360 PRINT ST$(N%,0)
1370 PRINT ST$(N%,1)
1380 PRINT
1390 REM SELECT STANDARD
1400 ?&FE60=N% OR &30
1410 IF HALF%(N%)
     THEN PROC_WAY
1420 PRINT "WORD FORMAT Options are:-
     "

1430 PRINT
1440 FOR A%=0 TO 7
1450 READ WF$(A%)
1460 PRINT ;A%;" - ";WF$(A%)
1470 NEXT
1480 PRINT
1490 REPEAT
1500 PRINT "CHOOSE WHICH YOU WANT";
1510 F%=GET AND &0F
1520 PRINT CHR$ (13);"CHOSEN - ";
     SPC (13)
1530 PRINT WF$(F%)
1540 UNTIL F%<8
1550 F%=F%*4
1560 ?&80=F%
1570 CALL RINT
1580 PRINT
1590 REPEAT
1600 PRINT "WHAT SCREEN MODE DO YOU
      WANT TO USE";
1610 M%=GET AND &0F
1620 UNTIL M%<8
1630 CLS
1640 ENDPROC
1650 DATA "BELL 103 ORIGINATE","300
      Baud full duplex",0
1660 DEF PROC_WAY
1670 *FX7,4
1680 *FX8,4
1690 PRINT "IS THIS A TEST IN LOOP
      BACK MODE ?";
1700 A$=GET$
1710 PRINT
1720 IF A$="Y"
     THEN ENDPROC
1730 PRINT "SENDING OR RECEIVING
      S/R ?";
1740 A$=GET$
1750 PRINT
1760 IF A$="R"
     THEN RTS=&20
     ELSE RTS=&10
1770 IF A$="S"
     THEN *FX7,1
1780 IF N% <> 8
     THEN ENDPROC
1790 PRINT "WARNING"
1800 PRINT "THIS MODE IS NOT SUPPORTE
     D"
1810 ENDPROC
1820 DATA "BELL 103 ANSWER","300
      Baud full duplex",0
1830 DATA "BELL 202","1200 BAUD half
      duplex",-1
1840 DATA "BELL 202","1200 BAUD half
      duplex + equalizer",-1
1850 DATA "CCITT V21 ORIGINATE"
     ,"300 Baud full duplex",-1
1860 DATA "CCITT V21 ANSWER","300
      Baud full duplex",0
1870 DATA "CCITT V23 Mode 2","1200
      BAUD half duplex",-1
1880 DATA "CCITT V23 Mode 2","1200
      BAUD half duplex + equalizer"
      ,-1
1890 DATA "CCITT V23 Mode 1","600
      Baud half duplex",-1
1900 DATA "7 bits + even parity +
      2 stop bits"
1910 DATA "7 bits + odd parity +
      2 stop bits"
1920 DATA "7 bits + even parity +
      1 stop bit"
1930 DATA "7 bits + odd parity +
      1 stop bit"
1940 DATA "8 bits + 2 stop bits"
1950 DATA "8 bits + 1 stop bit"
1960 DATA "8 bits + even parity +
      1 stop bit"
1970 DATA "8 bits + odd parity +
      1 stop bit"
```

This listing is included in this month's cassette tape offer. See order form on Page 177.

Datapen BBC Lightpen Programs Datapen



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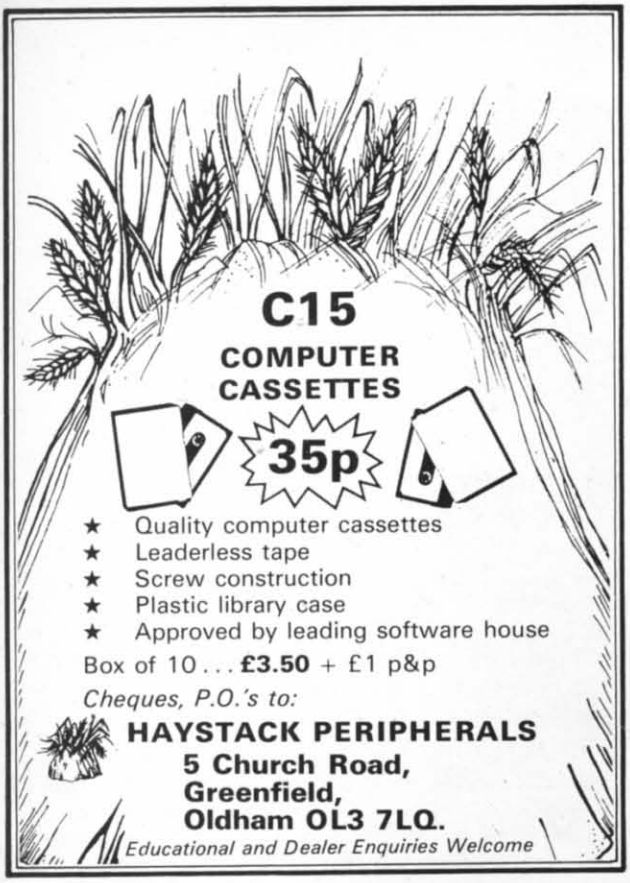

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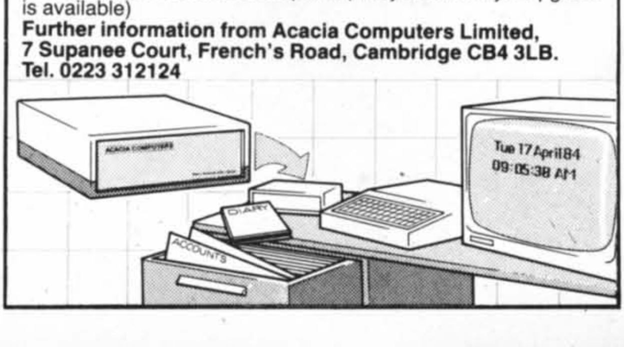

Plumbing the mystery of streaming information

USING micro computers as a means of communication is one of the fastest growing fields in computing today.

Perhaps the greatest stimulus to public interest in recent years has been the Walt Disney film "War Games" in which a young boy using his home computer manages to gain access to the American National Defence System, nearly sparking off World War III in the process.

While I will not be giving out numbers for the Ministry of Defence computers (or even Mark Thatcher's bank account) I will be trying to illustrate how your BBC Micro can become an intelligent terminal capable of talking to another micro or indeed just about any other type of computer.

In designing the BBC Micro, Acorn created an extremely flexible machine that is readily adapted to communications, the basis of this flexibility being the concept of streaming input and output.

To visualise this more clearly imagine the way in which the plumbing in your house works.

Although all the water comes from the same initial supply you can control where it appears simply by turning each tap on or off.

In this way material from one common source can be made to appear simultaneously in several different output streams.

This principle of directing a flow can most easily be seen in action on the BBC Micro when carrying out spooling of programs in memory to tape or disc, or listing programs to a printer.

The *SPOOL command instructs the operating system to send Ascii data to both the screen and filing system streams simultaneously, in much the same way as the Ctrl B or VDU2 command sends output to the screen and printer streams.

Each main output device on the BBC has its own stream down which the operating system will send output if the tap is open.

In this way at a simple level data may be output to the RS432 interface as easily as to the printer port.

This direction of output is controlled in Basic by use of the FX3,n command, where the value of n dictates which output channels will be open.

By ANDY HOOD

This is explained in some detail on Page 422 of the User Guide, but the values in which we will be particularly interested are:

*FX3,4 – Send output to the screen only.

*FX3,5 – Send output to screen and RS423 port.

*FX3,7 – Send output to RS423 only.

With these commands we can easily route data entered at the keyboard to the RS423. This forms the basis of sending data, so now we must look for the means of receiving it.

Again, input to the operating system is streamed in much the same way as output, but cannot sensibly come from a rather unintelligent screen or printer.

The streams that can supply adequate input are the keyboard, filing system (as in *EXECute filename) and – you guessed it – the RS423.

For this reason these are the only streams that have specific commands to

```
10 REM Program I
20 REM Dumb Terminal program for the
BBC Model B
30 OSBYTE=&FFF4
40 inputchar%=&70 :REM temporary
storage location
50 *FX7,3
60 *FX8,3
70 REM this sets receive and transmit
speeds to 300 baud
80 *FX2,2
90 REM take input from the keyboard
and enable RS423
100 PROCassemble_code
110 REM set up m.code receive routine
125 REPEAT
130 *FX3,5
135 REM send any keyboard characters
to screen and RS423
140 A%=INKEY(0) :REM test for key
press
145 IF A%>0 THEN VDU A% :REM print it
150 *FX3,4
155 REM send any received chars to
screen only
165 CALL getchar :REM check for RS423
input
170 B%=?inputchar% :REM retrieve char.
175 IF B%>0 THEN VDU B% :REM print it
180 UNTIL FALSE
185 END
300 DEFPROCassemble_code
310 DIM code%50 :REM make space for it
320 FOR X=1 TO 3 STEP 2
330 P%=code%
340 [ OPT X
350 .getchar
360 LDA #145 \ REM OSBYTE/FX CALL
370 LDX #1   \ REM RS423 INPUT
380 LDY #0   \ REM TO BE CHECKED
390 JSR OSBYTE
400 STY inputchar% \REM STORE
CHARACTER
410 RTS      \ REM BACK TO BASIC
420 ]
430 NEXT X
440 ENDPROC
```

Program I

From Page 127

route input from them directly to the operating system.

The direction of input in Basic is controlled by the *FX2,n command which behaves as follows:

***FX2,0** – Get input from the keyboard and disable the RS423 receiver – the default condition.

***FX2,1** – Get input from the RS423 port.

***FX2,2** – Get input from the keyboard and enable the RS423 receiver.

‘Each main output device on the BBC Micro has its own stream down which the operating system will send output if the tap is open’

It may seem at first sight that we could create a simple terminal program which would display characters received at the RS423, and send characters typed at the keyboard, merely by setting the appropriate *FX2 and *FX3 commands.

However on closer inspection of the *FX2 command it can be seen that there is no command that will accept characters from both the keyboard AND the RS423 simultaneously.

To demonstrate this enter *FX2,1. You will now find that your BBC appears to be ignoring you.

It will not acknowledge any input from the keyboard because it is only looking for its input from the RS423.

Hit Break and regain control.

So we know that characters can be routed in from both the keyboard and the RS423 streams and in each case be acknowledged by the operating system as input, but not apparently at the same time.

To get around this problem we need to set one input stream as the primary source and at the same time scan the other to see if any data has been received.

Fortunately the BBC Micro contains a built-in command to check and extract data from streams.

In Basic this is achieved by use of the *FX145,n command, where n represents the number of the stream to be checked.

However while it is easy to pass a variable – in this case the stream number – to an *FX call it is rather more cumbersome to return a variable or character value from it.

For this reason we will create a short machine code routine to inspect and pass information back to the Basic interpreter.

The BBC Micro has a powerful built-in assembler which easily interfaces with Basic and which can be used to pass variables through fixed memory locations accessible to machine code and Basic alike.

Program I shows how the OSBYTE 145 call, the machine code equivalent to *FX145, can be used to provide our scan and construct a functional, if simple, terminal program.

While this simple program will allow us to "talk" to another similarly configured computer it contains some restrictions that may prevent us from extending the program further.

If we wish to transfer text or program files between computers we must have a means of temporarily storing the incoming data and be able to accept all valid codes.

The method of testing for characters entering the keyboard or RS423 input streams relies on a value of 0 being returned if no input is pending.

Although this will not affect the transfer of Ascii data it could be disastrous in the transfer of machine code or Basic program files where a zero byte may form a valid part of the code.

One other point that we must be aware of is the way in which data entering via the RS423 is passed unchecked to the operating system through the VDU command.

Any corruption of the data into VDU driver codes that control display modes or other screen attributes may result in a fairly spectacular crash and subsequent loss of data.

Having removed the restrictions of Program I we will come to the method of "filtering out" this possible corruption in a later section.

To allow, at least initially, all codes to pass through without exclusion we must look again at the method of testing the RS423 stream for valid input.

The OSBYTE routine used in Program I actually sets a flag to indicate whether it was able to successfully extract a character from the stream inspected.

This is known as the carry flag and can be used to execute branches, the machine code equivalent of IF THEN GOTO, depending on its state.

When this flag is set it holds the value 1 and when clear 0. The assembly code instructions which react to the state of

→

```
   10 REM PROGRAM II
   20 OSBYTE=&FFF4
   30 inputchar%=&70
   40 carry%=&71
   50 clear%=0:set%=1
   60 !&70=0
   70 store%=TOP+200:top%=store%
   80 REM configure RS423 for 300 baud
 send and receive
   90 *FX7,3
  100 *FX8,3
  110 REM take input from keyboard
  120 *FX2,2
  130 PROCassemble_code
  300 REM program start
  310 REPEAT
  320 *FX3,5
  330 A%=INKEY(0)
  340 IF A%>0 THEN VDU A%
  350 *FX3,4
  360 CALL getchar
  370 IF ?carry%=set% THEN 410
  380 B%=?inputchar% : VDU B%
  390 ?top%=B%
  400 top%=top%+1
  410 UNTIL FALSE
  420 END
  430 DEFPROCassemble_code
  440 DIM code%50
  450 FOR X=1 TO 3 STEP 2
  460 P%=code%
  470 [OPT X
  480 .getchar
  490 LDA #clear%
  500 STA carry%
  510 LDA #145
  520 LDX #1
  530 LDY #0
  540 JSR OSBYTE
  550 BCC gotchar
  560 .nochar
  570 LDA #set%
  580 STA carry%
  590 .gotchar
  600 STY inputchar%
  610 RTS
  620 ]
  630 NEXT X
  640 ENDPROC
```

Program II

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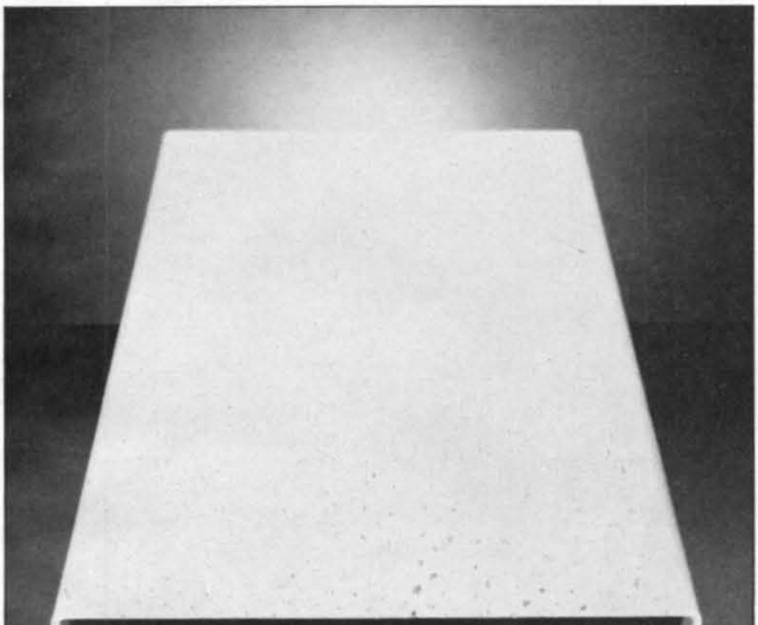

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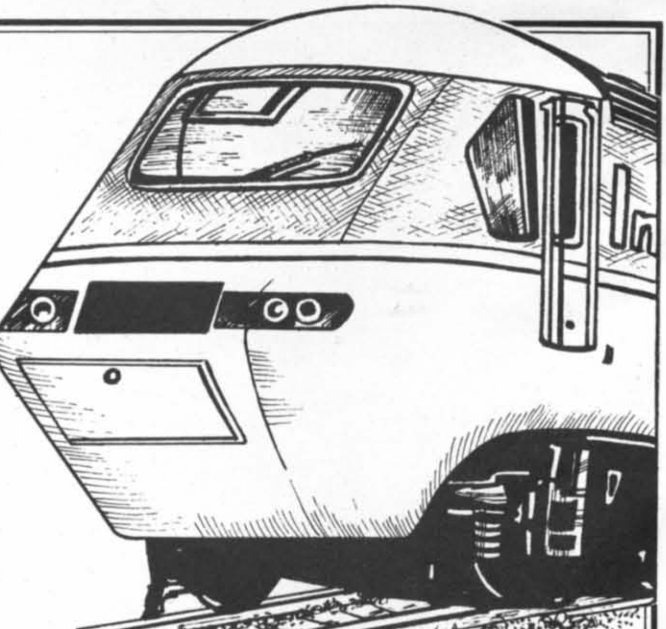

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From Page 128

this flag are BCC <address> – GOTO if carry clear and BCS <address> – GOTO if carry set.

We can reproduce this flag in Basic by duplicating the value of the carry flag in a fixed memory location in much the same way as we pass the character value back.

This approach, incorporated in Program II, enables our program to detect whether anything has been received at the RS423 without the zero byte exclusion.

To create a store or buffer we must first decide where the data is to be placed in memory.

You may remember from previous magazine articles that Basic stores the values of variables directly above the program text and that the variable TOP gives us the first free address after the last program line.

By setting the start of our store to 200 bytes above the program TOP we can avoid any conflict with Basic. This is the method used in Program II.

As each character is received it is POKEd directly into memory and a counter to point to the next free location is incremented.

> **‘To create a store or buffer we must first decide where the data is to be stored in memory’**

When all data has been received the program is ESCaped and the store may be transferred to tape or disc by *SAVEing the area of memory between store% and top%.

Notice how line 350 constantly switches the output stream to ensure that received characters are not then re-sent, or echoed, to the other terminal.

If we wish to override this and provide an echo all we need do is delete line 350 from the listing. Data received will then be sent back to the transmitting terminal.

Care must be taken in doing this, though, as if each terminal has output permanently routed to both screen and RS423 they will echo each other's echo indefinitely.

With Program II we have created a basic terminal program that is capable of receiving and storing data sent from a remote system. The program's main restrictions now lie in how quickly it can perform this task.

● *In my next article I will look at ways in which we can replace more of the Basic program with machine code and provide control of the protocols, or etiquette, used in computer communications.*

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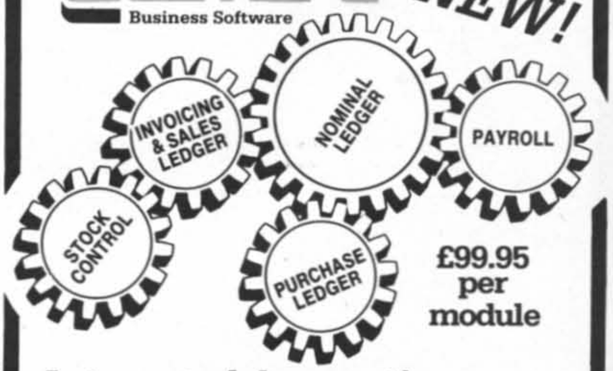

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6502 Second Processor *Acorn*

Enter the Second Processor – and wasn't it well worth the wait!

THE first of the long awaited add-ons for the Tube has finally arrived. It is the 3MHz 6502B Second Processor, and it has been well worth the wait.

A second processor is basically another microprocessor with associated extra memory, power supply and other necessities that will talk to your BBC Micro across the Tube interface.

Three of these were originally promised by Acorn – the 6502B, a Z80 processor to allow access to the massive software base of CP/M, and the 16032, a 16 bit processor.

They are designed to be the workhorse of the linked pair in that the BBC Micro becomes a "simple" input/output processor, handling keyboard, graphics, sound and operating system commands.

The Tube is capable of fast communication (2MHz). The Tube ULA with the second processor's "first in, first out" buffers supports a speed at least 1.5 times that of the raw BBC Micro.

The major advantage however is that your usable RAM grows dramatically. There is 64k of RAM in the second processor, not all of it available for program or data, but HIMEM is independent of the graphics mode in use.

Two ROMs come with the processor. They are called HIBasic and DNFS. The DNFS is a 16k eprom with DFS 1.2 plus NFS 3.40 (perhaps the rumours about Econet aren't true after all). HIbasic – I'll leave for later.

The processor is connected to the BBC Micro by a very short ribbon cable, presumably of necessity, via the Tube connector.

On switching on the message:

```
Acorn TUBE 6502 64k
```

is seen. Printing PAGE gives &800, and HIMEM is at &8000, irrespective of screen mode. What happens on switch on is detailed in the manual.

- Tube software is copied from the DNFS to a RAM area in the I/O processor.
- The second processor operating system is copied from ROM to RAM in the second processor. This is located at &F800.
- The start up language ROM in the I/O processor is copied to the second processor.

This last action is where HIBasic comes in. If the micro is started up in Basic then it is copied to its normal position in the second processor. But HIBasic is a relocated version of Basic designed to be at &B800. With this the user has from &800 to &B7FF free and can still use Basic, some 44k of memory.

You can even start up in Basic and simply ship HIBasic across by using a simple *FX call. For machine code programmers the story is even better as from &400 to &F7FF (61k) is available.

Shipping ROM contents across is not limited to Basic, and "languages" like View and BCPL can be moved to the second processor RAM, although as yet HI versions are not available.

Most service ROMs that I tried, however, do not operate correctly with the second processor on. In addition, various operating system entry points that are not officially documented are trapped in the second processor's operating system to give the message "Bad".

One other useful facility made available in this configuration is that the character fonts are "exploded" at start up – and why not, as the I/O processor's RAM is not being used for much else?

In addition, languages in ROM can be simply stored to disc and then reloaded into the second processor, thus freeing some sideways ROM space.

Finally, if you want to run machine code only, a new command is made available, *GO. With a *GO F800 the > prompt is replaced by a * and only operating system filing system commands are available.

The manual supplied has 49 pages, about half of which contain the complete description of the difference between Basic I and Basic II (the same as HIBasic), and the features of the new filing systems in DNFS.

The rest is devoted purely to the use of the second processor, and explains how to read from/write to the I/O processor using OSWORD, shows memory maps and how I/O memory differs from second processor memory.

With the enormous increase in free RAM – by BBC Micro standards – the possibilities for new software ventures are amazing. An indication as to what can be done is the Bitstik software, which has to be seen to be believed.

Alan Plume

Bitstick brings in stunning graphics

Bitstik *Acorn/Robocom*

THIS is the first software release from Acorn that relies on the 6502 Second Processor. Bitstik first appeared some years ago on the Apple II computer. Even on the Apple, with its fairly low resolution, the graphics that could be produced with it were very good. On the BBC with a 3MHz 6502 they are stunning.

To use the Bitstik requires quite a lot of equipment. The BBC Micro, Second Processor, dual 80 track disc drives, a colour monitor plus the Bitstik and associated software will cost about £1,800 if you shop around. It sounds a lot of money, but it would be difficult to beat it for quality per pound, if that is a valid unit.

The software comes on three discs, and a 8k eprom. The package itself is menu-driven throughout, and the majority of input is via a three axis joystick with three push buttons that plugs into the analogue port.

The package is auto-booted into an

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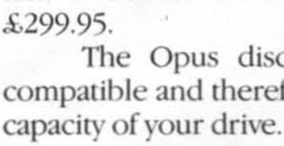

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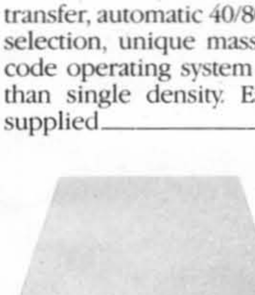

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From Page 132

initial menu page from which selection is by keyboard. After shuffling the discs the drawing package proper is entered.

The display is in Mode 1 with a text menu at the right and a pictorial menu at the bottom. Picking is done using the joystick and combinations of the three push buttons.

The pictorial menu gives a choice of line type, including straight line, three arc types, nibs, line colour and dotted lines.

With any of the arc type lines chosen the speed of the software can be truly appreciated. The movement of the arcs with the joystick control appears to be virtually instantaneous. I was amazed.

The text menu allows drawing by discrete points, tracing (continuous control over a drawing point), erasing, painting, zooming, panning and other facilities.

If PAINT is chosen the pictorial menu changes to give a palette made up of the four default colours and 12 "dithered" colours. The fill is very fast – there must be some very crafty code there!

The palette can be changed, but it is a somewhat tedious process involving numerous disc accesses.

The COPY command gives the user access to the library disc that is supplied with the system. This contains "pages" of illustrations, with either four or 16 per page.

The pages are indexed, and any individual drawing can be transferred to the main workpage. Conversely a user-prepared drawing can be transferred to a library slot.

On picking a drawing it can be transformed in numerous ways before being laid down on the workpage. It can be mirrored, squashed or stretched, and of course multi-images may be deposited.

Once drawn, one can ZOOM and PAN on the image, thus the user can construct an image of almost unbelievable detail very simply.

Accurate drawings can be made after accessing a second text menu that allows grids, both orthogonal and angled, to be drawn with the cursor locked on to them.

Numerous other locking facilities allow very tight control over the cursor movement and quite complicated constructions can be built up very simply.

Drawings can be annotated using the very elegant character set available which can be magnified, shrunk or rotated. Text can be positioned anywhere on the drawing.

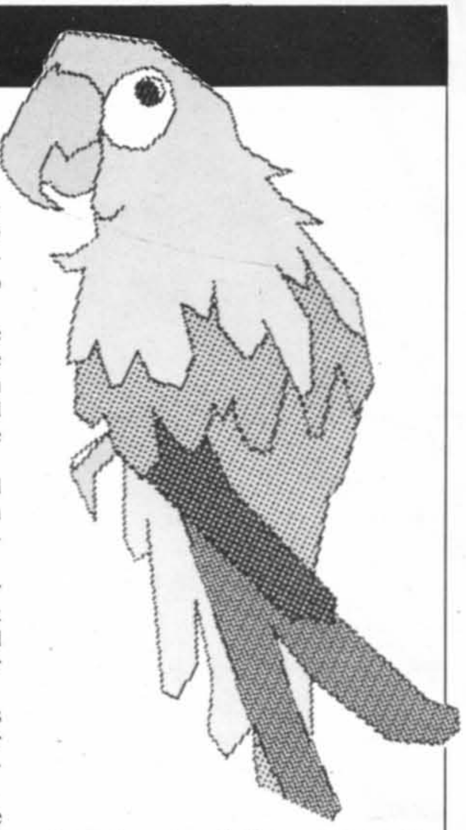
The manual has 167 pages, most of which are taken up by a number of tutorials that guide the user through the many features this package contains.

Although it would take some considerable time to become completely familiar with all the facilities, it gives you a very good "hands-on" introduction.

There are no facilities for interfacing the package to a digitiser, which would have made a very useful addition. There are, however, ways of getting hardcopy from the screen.

A screendump is provided, unfortunately for an Olivetti inkjet printer, but a screen image can be saved as a screen with the menu sections removed and then dumped.

Illustrated is a painted version of the parrot supplied in one of the library files that has been screen-dumped on a Diablo CT150 colour inkjet printer.



Alan Plume

When you need just a few more ROMs...

ROM Expander Board
2nd Generation Software

ONE of the shortcomings of the BBC Micro is the lack of ROM sockets for anyone who needs a little more variety of additional ROM-based utilities. One of the ways to overcome this is to invest in an expansion board.

There are 12 and 16-way boards available but I only visualised needing three or four, and to this end I have recently fitted a four-way ROM Expander Board from 2nd Generation Software.

I know very little about the internal hardware of the BBC. Despite this, I decided to attempt to fit the board myself, and found it easy to install as long as you follow the simple instructions.

First, remove the keyboard and then the Basic ROM from the internal ROM socket. Place the Basic ROM in the left hand socket of the new board.

The board itself is about five inches long and slots in the second main ROM socket from the right of the micro, lying in piggy-back fashion over the remainder.

There are three wires to solder onto pins 11, 12 and 13 of IC76 and a link to insert in S21 south, and that's it – you've done it.

I must admit that on power up I was confronted with a blank screen and, assuming I had done something wrong, checked all my new alterations, but to no avail.

My error – and this is worth bearing in mind if you are new to the inside of your micro – was to not replace the keyboard connector properly. This done it worked perfectly.

The board is very reliable and has not overheated or caused any inexplicable system crashes. It is fully guaranteed for 12 months against electronic and connector faults.

Only time will tell, but I'm very pleased with my first introduction to this piece of hardware and at £19.95 I feel it is excellent value for money.

Joseph Royle

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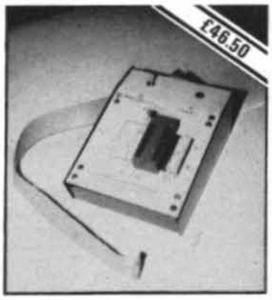

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EARLY YEARS 1
A) MICKEY THE MONKEY and his apple tree make subtraction fun.
B) COLOUR BLOCKS bring sizes and colour into perspective.
C) MERRY MUSIC turns the keyboard into a musical keyboard.
D) FUNNY FACES presents a line up, which one is the suspect?
E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2
A) THE POND seems very active today
B) SPEED is required to keep the cake on the conveyor belt.
C) DIRECTIONS seem to be needed by everyone in Orion village.
D) ORDER the blocks.
E) SID THE SPIDER needs some help to get out of the maze.

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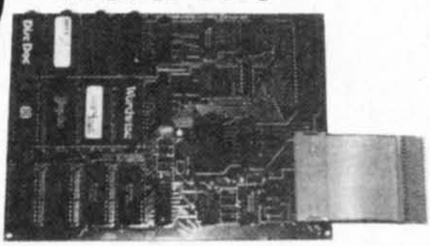

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Backgammon listing

From Page 81

The listings in this article are produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of *The Micro User*.

```
 10 REM BACKGAMMON - J.AUGHTON
     1984
 20 REM (C) MICRO USER
 30 DIM A%(25),D$(3),WF(5),WT(5)
 40 MODE 6
 50 PROCinitial
 60 PROCrules
 70 MODE 1
 80 VDU 19,2,2;0;23;11,0;0;0;0
 90 REPEAT
    :PROCgame
    :UNTIL Z%=14
100 PRINT '''
110 END
120
130 REM ******* PROCEDURES ETC.
     *******
140
150 DEF PROCinitial
160 VDU 19,1,6;0;
170 VDU 23,224,24,126,126,-1,-1
    ,126,126,24
180 VDU 23,225,60,126,231,195,195
    ,231,126,60
190 VDU 23,226,0,0,24,60,60,24
    ,0,0
200 VDU 23,227,-1,-1,-1,-1,-1,-1
    ,-1,-1
210 FOR I%=1 TO 5
    :READ WF(I%)
    :NEXT
220 FOR I%=0 TO 5
    :READ WT(I%)
    :NEXT
230 READ WD%,WH%,WB%,WC%
240 Mw=0
    :Yw=0
    :Mp=0
    :Yp=0
250 FOR I%=1 TO 3
    :READ A$
260 FOR J%=1 TO 18
270 IF MID$(A$,J%,1)=" "
    THEN Temp%=32
    ELSE Temp%=226
280 D$(I%)=D$(I%)+CHR$ (Temp%)
290 NEXT J%,I%
300 Jeff=RND(-TIME )
310 ENDPROC
320
330 DEF PROCgame
340 PROCsetup
350 PROCboard
360 PROCinfo("Yours is the left
     die-mine is the right")
370 REPEAT
    :PROCdice
    :UNTIL D1%<>D2%
380 IF D1%<D2%
    THEN 400
390 PROCyou
    :IF Hp=0
    THEN 450
400 PROCme
    :IF Cp=0
    THEN 530
410 GOTO 390
420 REM
430 REM *** YOU WIN ***
440 REM
450 A$="YOU"
    :Yw=Yw+1
    :X%=50*Cb
460 FOR I%=1 TO 24
470 IF A%(I%)>0
    THEN X%=X%+I%*A%(I%)
480 NEXT
490 Yp=Yp+X%
    :GOTO 600
500 REM
510 REM *** I WIN ***
520 REM
530 A$="I"
    :Mw=Mw+1
    :X%=50*Hb
540 FOR I%=1 TO 24
550 IF A%(I%)<0
    THEN X%=X%+(I%-25)*A%(I%)
560 NEXT
    :Mp=Mp+X%
570 REM
580 REM *** END OF GAME ***
590 REM
600 PROCinfo("Game over")
    :PROCwait
610 PROCinfo(A$+" WIN")
    :PROCwait
620 VDU 26,12
630 PRINT 'A$; " scored ";X%;" point
    s-the score is now:"
640 PRINT TAB(18,5)"Games   Points"
650 PRINT TAB(1,7)"Me........"
    ,Mw,Mp
660 PRINT TAB(1,9)"You......."
    ,Yw,Yp
670 REPEAT
680 PRINT TAB(1,13)"Do you want
     to play again?(Y/N)  ";
    :VDU 8
690 PROCin
700 UNTIL Z%=14 OR Z%=25
710 ENDPROC
720
730 DEF PROCsetup
740 RESTORE 3380
750 FOR I%=1 TO 24
    :READ A%(I%)
    :NEXT
760 Cb=0
    :Hb=0
    :Flag%=0
    :Cp=15
    :Hp=15
770 ENDPROC
780
790 DEF PROCboard
800 COLOUR 131
    :GCOL 0,130
    :CLS
810 VDU 24,56;56;608;904;16
820 VDU 24,672;56;1224;904;16,26
830 PROCpoints(56,56,1,1)
840 PROCpoints(672,56,1,1)
850 PROCpoints(56,904,-1,0)
860 PROCpoints(672,904,-1,0)
870 FOR I%=1 TO 6
880 READ X%,Y%,S%,Z%
890 MOVE X%,Y%
    :DRAW S%,Z%
900 NEXT
910 VDU 5
    :COLOUR 0
920 FOR I%=1 TO 12
930 MOVE 92*I%-64*(I%>6)-4,944
    :VDU 64+I%
940 MOVE 92*I%-64*(I%>6)-4,32
    :VDU 89-I%
950 NEXT
960 FOR I%=1 TO 24
    :PROCpiece(I%)
    :NEXT
970 ENDPROC
980
990 DEF PROCpoints(X%,Y%,S%,Col%)
1000 MOVE X%,Y%
1010 FOR I%=1 TO 6
1020 Col%=1-Col%
    :GCOL 0,Col%
```

→

Backgammon listing

From Page 137

```
1030 PLOT 0,46,352*S%
     :PLOT 81,46,-352*S%
1040 NEXT
1050 ENDPROC
1060
1070 DEF PROCpiece(N%)
1080 VDU 26,5
1090 IF (N%AND 1)
     THEN Col%=1
     ELSE Col%=0
1100 X%=92*N%-64*(N%>6)-4
     :Y%=900
     :S%=-1
1110 IF N%>12
     THEN X%=92*(25-N%)-64*(N%<19)-4
     :Y%=84
     :S%=1
1120 Tot%=A%(N%)
     :Swop%=1
1130 IF Tot%<0
     THEN Typ%=224
     ELSE Typ%=225
1140 Tot%=ABS (Tot%)
     :Temp%=Tot%
1150 IF Tot%>5
     THEN Tot%=1
1160 FOR J%=1 TO 5
1170 MOVE X%,Y%
1180 IF Tot%=0
     THEN Typ%=32
1190 VDU 18,0,Col%,227,8,18,0,3
     ,Typ%
1200 Tot%=Tot%-1
     :Y%=Y%+36*S%
1210 NEXT
1220 IF Temp%<6
     THEN 1250
1230 MOVE X%,Y%-36*S%
     :VDU 48+Temp%
1240 MOVE X%,Y%-108*S%
     :VDU 88
1250 ENDPROC
1260
1270 DEF PROCbar(Y%,Typ%,Tot%)
1280 VDU 26,4
1290 COLOUR 3
     :COLOUR 130
1300 FOR I%=1 TO 8
1310 IF Tot%=0
     THEN Typ%=32
1320 PRINT TAB(20+2*I%,Y%)CHR$ (Typ%)
1330 Tot%=Tot%-1
1340 NEXT
1350 ENDPROC
1360
1370 DEF PROCdice
1380 VDU 26,4
1390 COLOUR 0
     :COLOUR 131
1400 S%=TIME
1410 REPEAT
1420 D1%=RND(6)
     :D2%=RND(6)
1430 X%=3*D1%-2
     :Y%=3*D2%-2
1440 FOR I%=1 TO 3
1450 PRINT TAB(3,14+I%)MID$(D$(I%)
     ,X%,3)
1460 PRINT TAB(8,14+I%)MID$(D$(I%)
     ,Y%,3)
1470 NEXT
1480 UNTIL TIME >S%+180
1490 ENDPROC
1500
1510 DEF PROCyou
1520 PROCinfo("It's your move...")
1530 IF Flag%
     THEN PROCdice
1540 Flag%=1
     :Swop%=0
1550 IF D1%=D2%
     THEN M%=4
     ELSE M%=2
1560 PROCwait
1570 PROCinfo("Your move with the
      "+STR$ (D1%)+" : ")
1580 PROCin
1590 IF Z%<26
     THEN 1640
1600 IF Swop%=0
     THEN PROCswop
     :GOTO 1570
1610 PROCinfo("Apparently you can't
      move (??)")
1620 PROCwait
1630 GOTO 2090
1640 IF Z%<25
     THEN 1720
1650 IF Hb>0
     THEN 1680
1660 PROCinfo("You have no piece
      on the bar")
1670 GOTO 1560
1680 IF A%(D1%)>1
     THEN 1970
1690 Z%=0
     :Hb=Hb-1
1700 PROCbar(17,224,Hb)
1710 GOTO 2000
1720 IF Hb=0
     THEN 1750
1730 PROCinfo("You can't move-you're
      on the bar")
1740 GOTO 1560
1750 IF A%(Z%)<0
     THEN 1780
1760 PROCinfo("You have no piece
      there!!")
1770 GOTO 1560
1780 IF Z%+D1%<25
     THEN 1960
1790 Temp%=0
1800 FOR I%=19 TO 24
1810 IF A%(I%)<0
     THEN Temp%=Temp%-A%(I%)
1820 NEXT
1830 IF Temp%=Hp
     THEN 1860
1840 PROCinfo("That move is off the
      board !!")
1850 GOTO 1560
1860 Temp%=0
1870 FOR I%=19 TO Z%-1
1880 IF A%(I%)<0
     THEN Temp%=I%
1890 NEXT
1900 IF (Temp%=0)OR (Z%+D1%=25)
     THEN 1930
1910 PROCinfo("Illegal!! - You have
      a piece at "+CHR$ (Temp%+64))

1920 GOTO 1560
1930 Hp=Hp-1
     :IF Hp=0
     THEN 2090
1940 A%(Z%)=A%(Z%)+2
1950 GOTO 2040
1960 IF A%(Z%+D1%)<2
     THEN 1990
1970 PROCinfo("Sorry,that point is
      blocked")
1980 GOTO 1560
1990 A%(Z%)=A%(Z%)+1
     :PROCpiece(Z%)
2000 Z%=Z%+D1%
     :IF A%(Z%)<1
     THEN 2040
2010 A%(Z%)=0
2020 PROCpiece(Z%)
2030 Cb=Cb+1
     :Flag%=2
2040 A%(Z%)=A%(Z%)-1
     :M%=M%-1
2050 PROCpiece(Z%)
2060 PROCbar(15,225,Cb)
2070 IF Flag%=2
     THEN PROCinfo("Ouch !! - you
```

→

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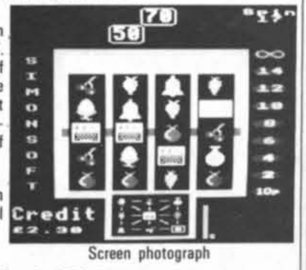

Screen photograph

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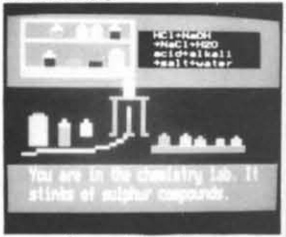

```
HCl+NaOH
+NaCl+H2O
acid+alkali
+salt+water
```

```
You are in the chemistry lab. It
stinks of sulphur compounds.
```

Screen photograph

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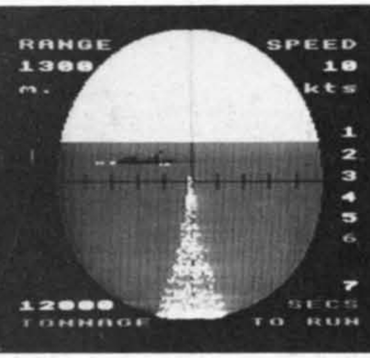

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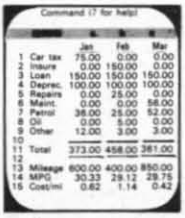

```
        Command (? for help)
            A       B       C
           Jan     Feb     Mar
 1 Car tax  75.00    0.00    0.00
 2 Insure    0.00  150.00    0.00
 3 Loan    150.00  150.00  150.00
 4 Deprec. 100.00  100.00  100.00
 5 Repairs   0.00   25.00    0.00
 6 Maint.    0.00    0.00   56.00
 7 Petrol   38.00   25.00   52.00
 8 Oil       0.00    5.00    0.00
 9 Other    12.00    3.00    3.00
10
11 Total   373.00  458.00  361.00
12
13 Mileage 600.00  400.00  850.00
14 MPG      30.33   29.12   29.75
15 Cost/mi   0.62    1.14    0.42
```

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From Page 138

```
     got me !")
     :PROCwait
2080 Flag%=1
     :D1%=D2%
     :IF M%>0
     THEN 1570
2090 ENDPROC
2100
2110 DEF PROCme
2120 PROCinfo("It's my turn...")
2130 IF Flag%
     THEN PROCdice
     ELSE PROCwait
2140 IF D2%>D1% PROCswop
2150 Flag%=1
     :Swop%=0
2160 IF D1%=D2%
     THEN M%=4
     ELSE M%=2
2170 IF Cb=0
     THEN 2290
2180 IF A%(25-D1%)=-1
     THEN 2250
2190 IF A%(25-D2%)=-1
     THEN 2240
2200 IF A%(25-D1%)>-1
     THEN 2250
2210 IF A%(25-D2%)>-1
     THEN 2240
2220 PROCinfo("I'm stuck on the bar")
2230 GOTO 2580
2240 PROCswop
2250 PROCinfo("I'll come off the
      bar with the "+STR$ (D1%))
2260 Cb=Cb-1
     :VDU 7
     :PROCwait
2270 PROCbar(15,225,Cb)
     :Z%=25
2280 GOTO 2500
2290 Temp%=0
2300 FOR I%=1 TO 6
2310 IF A%(I%)>0
     THEN Temp%=Temp%+A%(I%)
     :X%=I%
2320 NEXT
2330 IF Temp%<Cp
     THEN 2410
2340 IF A%(D1%)<1
     THEN 2370
2350 PROCinfo("I will bear off with
      the "+STR$ (D1%))
2360 Z%=D1%
     :GOTO 2390
2370 Z%=X%
     :IF Z%>D1%
     THEN 2410
2380 PROCinfo("I can bear off at
      "+CHR$ (64+Z%)+" with the "+
     STR$ (D1%))
2390 Cp=Cp-1
     :IF Cp=0
     THEN 2580
2400 A%(Z%)=A%(Z%)-2
     :VDU 7
     :GOTO 2520
2410 IF Hb
     THEN 2450
2420 X%=0
     :REPEAT
     :X%=X%+1
     :UNTIL A%(X%)<0
2430 Y%=25
     :REPEAT
     :Y%=Y%-1
     :UNTIL A%(Y%)>0
2440 IF X%>Y%
     THEN Z%=Y%
     :GOTO 2470
2450 PROCbest
2460 IF Z%=0 PROCinfo("I can't move")
     :GOTO 2580
2470 PROCinfo("I will move from "+
     CHR$ (64+Z%)+" with the "+
     STR$ (D1%))
2480 VDU 7
     :PROCwait
2490 A%(Z%)=A%(Z%)-1
     :PROCpiece(Z%)
2500 Z%=Z%-D1%
2510 IF A%(Z%)=-1
     THEN A%(Z%)=0
     :Hb=Hb+1
     :PROCinfo("Take that!!!!")
2520 A%(Z%)=A%(Z%)+1
     :M%=M%-1
2530 PROCpiece(Z%)
2540 PROCbar(17,224,Hb)
2550 PROCwait
2560 D1%=D2%
     :IF M%>0
     THEN 2170
2570 ENDPROC
2580 VDU 7
     :PROCwait
2590 ENDPROC
2600
2610 DEF PROCbest
2620 Z%=0
     :Ev=-99999
2630 PROCtrish
2640 PROCswop
2650 PROCtrish
2660 IF X%<>D1%
     THEN PROCswop
2670 ENDPROC
2680
2690 DEF PROCtrish
2700 WF(2)=-70
     :WT(1)=-60
2710 IF (M%=1)OR (M%=3)
     THEN WF(2)=-300
     :WT(1)=-280
2720 FOR I%=D1%+1 TO 24
2730 KF%=A%(I%)
     :KT%=A%(I%-D1%)+1
2740 IF (KF%<1)OR (KT%<0)
     THEN 2840
2750 IF KF%>5
     THEN KF%=5
2760 IF KT%>5
     THEN KT%=5
2770 V=I%*WD%+WF(KF%)+WT(KT%)
2780 IF KF%=2
     THEN V=V+(24-I%)*WB%
2790 IF KT%=0
     THEN V=V+(I%-D1%)*WH%
2800 IF (KT%=1)OR (KT%=0)
     THEN V=V+(25-I%+D1%)*WB%
2810 IF (KT%>1)OR (M%=1)OR (I%-D1%+D2
     %>24)
     THEN 2830
2820 IF A%(I%-D1%+D2%)>2
     THEN V=V+WC%
2830 IF V>Ev
     THEN Ev=V
     :Z%=I%
     :X%=D1%
2840 NEXT
2850 ENDPROC
2860
2870 DEF PROCinfo(A$)
2880 COLOUR 3
     :COLOUR 128
2890 VDU 4,28,0,1,39,0,12
2900 PRINT A$;
2910 ENDPROC
2920
2930 DEF PROCin
2940 *FX15,1
2950 VDU 23;11,255;0;0;0
2960 REPEAT
     :Z%=GET -64
     :UNTIL (Z%>0)AND (Z%<27)
2970 VDU 64+Z%,23;11,0;0;0;0
2980 ENDPROC
2990
```

Backgammon listing

From Page 141

```
3000 DEF PROCswop
3010 Swop%=D1%
     :D1%=D2%
     :D2%=Swop%
3020 ENDPROC
3030
3040 DEF PROCwait
3050 S%=TIME
3060 REPEAT UNTIL TIME >S%+200
3070 ENDPROC
3080
3090 DEF PROCrules
3100 PRINT TAB(15)"BACKGAMMON"'
3110 PRINT "This game of Backgammon
      plays the usual"
3120 PRINT "rules,which you should
      know before play-";
3130 PRINT "ing.You are moving clockw
     ise and use the";
3140 PRINT "solid pieces.I move antic
     lockwise and my";
3150 PRINT "home table is at the
      top left."'
3160 PRINT "I will roll the dice
      (fairly!!) and you"
3170 PRINT "select your move using
      the keys A-Z."'
3180 PRINT "A-X are used to move
      FROM a point.If you";
3190 PRINT "can't use a dice roll,pre
     ssing Z will"
3200 PRINT "exchange the dice (and
      a second press"
3210 PRINT "surrenders that move).The
      Y key is used"
3220 PRINT "to return from the bar."
3230 PRINT '''TAB(9)"PRESS SPACE
      TO PLAY"
3240 VDU 23;11,0;0;0;0
3250 REPEAT UNTIL GET =32
3260 ENDPROC
3270
3280 REM ******* WEIGHTS *******
3290
3300 DATA 100,-300,200,340,570
3310 DATA 350,-280,400,110,-310
     ,-730
3320 DATA 24,44,-65,1290
3330
3340 REM ******* OTHER DATA *******
3350
3360 DATA "      XX  X XX XX X","
      X    X    X X X","   X
       XX XX XX X"
3370
3380 DATA -2,0,0,0,0,5,0,3,0,0,0
     ,-5
3390 DATA 5,0,0,0,-3,0,-5,0,0,0
     ,0,2
3400
3410 DATA 54,54,54,906,610,54,610
     ,906,670,54,670,906
3420 DATA 1226,54,1226,906,54,54
     ,1226,54,54,906,1226,906
```

This listing is included in this month's cassette tape offer. See order form on Page 177.

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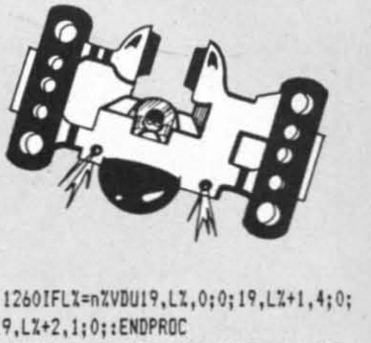
Department of Psychology
UNIVERSITY OF NEWCASTLE UPON TYNE
NE1 7RU

Doomrun listing

From Page 69

```
  520IFINKEY(-Q%)PROCscl
  530PROCsi:PROCx:GCOL0,7:MOVEP%,64:V
DU250:GCOL3,7
  540UNTILsum%=1ORP%<1ORdim%=15
  550IFsum%=1sum%=0:dim%=dim%+1
  560GOTO460
  570DEFPROC3rd
  580VDU4:COLOUR12:PRINTTAB(2,0)"Prep
are Yourself":VDU5
  590PROC2sh:GCOL3,7
  600PROCva:sum%=0:T1%=768:P1%=1280:J
%=4:x%=10:Z=0:PROC2sc:Y3=732:PROC3ti:
Y2=1024:Y3=748:PROC2ti
  610VDU19,15,1;0;19,8,7;0;19,12,6;0;
:VDU4:COLOUR12:PRINTTAB(2,0)" range
  score "TAB(12,1);H%:VDU5
  620REPEAT
  630PROC3sp
  640PROCfl
  650PROCsi
  660PROC3sp
  670VDU4:COLOUR12:PRINTTAB(3,1);T%DI
Ve%;" Km ":VDU5
  680PROCfl
  690PROCx:GCOL0,7:MOVEP1%,64:VDU250:
GCOL3,7
  700UNTILsum%=15ORP1%<10:MOVES%+S2%,
T%:VDUU:ENDPROC
  710DEFPROC4th:LOCALI%,J1%:MOVEA%,A2
%:VDU62:MOVEA1%,A2%:VDU60:MOVEA%,128:
VDU62:MOVEA1%,128:VDU60
  720PROC2sh:GCOL3,7:tar%=1:@%=1
  730FORJ1%=1TO50+RND(100):PROCfl:FOR
I%=1TO200:NEXTI%,J1%
  740PROC2ch:PROCva:tar%=1:sum%=0:J%=
4:J=1280:VDU19,0,15;0;:x%=RND(6)*100+
300:t%=32
  750REPEAT
  760PROCfl
  770PROCsi
  780PROC2sp
  790PROC2she:J=J-8
  800PROC2sp
  810IF@%=1H%=H%+J:VDU4:PRINTTAB(12,1
);H%:VDU5:@%=0
  820UNTILJ<0ORsum%=5:ENDPROC
  830DEFPROClg
  840IFL%=n%VDU19,8,0;0;19,9,7;0;19,1
0,7;0;:ENDPROC
  850IFL%=o%VDU19,8,7;0;19,9,7;0;19,1
0,0;0;:ENDPROC
  860IFL%=q%VDU19,8,7;0;19,9,0;0;19,1
0,7;0;
  870ENDPROC
  880DEFPROCva:T%=0:S%=0:S2%=0:U=32:G
%=384:G1%=243:J%=2:X%=64:XR%=1200:Y1%
=120:Z%=24:K%=160:K1%=1024:U%=240:S3%
=0:S=640:V=247:Z=0:L%=13:sum%=0:a%=85
5:b%=423:c%=1120:d%=64:e%=100:f%=32:g
%=58:h%=64:i%=193:j%=1279:C%=1:A%=0:A
1%=1212:A2%=128
  890r%=1280:x%=10:p%=248:u%=8:t1%=24
9:w%=0:y%=0:z%=0:v%=616:A3%=0:n%=13:o
%=14:q%=15:Y2=160:Y3=740:tar%=0:xx%=4
6:X=0
  900ENDPROC
  910DEFPROC2sc:LOCALI%
  920VDU19,1,0;0;19,2,0;0;19,3,0;0;
  930VDU19,4,7;0;19,5,7;0;19,6,7;0;
  940X%=0:Y%=735:X3%=1279:F%=4:M%=0:N
%=0
  950REPEAT
  960FORI%=1TOM%DIV8
  970GCOL0,C%
  980MOVEX%,Y%:DRAWX3%,Y%
  990Y%=Y%-F%
 1000M%=M%+1:N%=N%+1:NEXT
 1010C%=C%+1:IFC%>3C%=1
 1020Z=Z+1:UNTILZ=36:ENDPROC
 1030DEFPROCti:LOCALI%
 1040VDU19,15,0;0;19,14,0;0;19,13,0;0
;
 1050L=13:X=56
 1060FORI%=-6280TO15508STEP96:L=L+1:I
FL>15L=13
 1070GCOL0,L:MOVEX,Y3:DRAWI%,Y2:X=X+8
:NEXT:GCOL3,7:VDU19,13,J%;0;19,15,J%;
0;:X%=64:ENDPROC
 1080DEFPROC2ti
 1090VDU19,15;0;0;:L=15:X=56
 1100FORI=-6280TO15508STEP144
 1110GCOL0,L:MOVEX,Y3:DRAWI,Y2:X=X+12
:NEXT:GCOL3,7:VDU19,13,J%;0;19,15,J%;
0;:X%=64:ENDPROC
 1120DEFPROC3ti:LOCALI%
 1130L=0:X=56
 1140FORI%=-6280TO15508STEP144
 1150GCOL0,L:MOVEX,Y3:DRAWI%,Y2:X=X+1
2:NEXT:X%=64:ENDPROC
 1160DEFPROCscr
 1170L%=L%+1:IFL%>15L%=13
 1180PROClg:z%=+h%
 1190IFL%=n%VDU19,L%,0;0;19,L%+1,4;0;
19,L%+2,1;0;:ENDPROC
 1200IFL%=o%VDU19,L%,0;0;19,L%+1,4;0;
19,L%-1,1;0;:ENDPROC
 1210IFL%=q%VDU19,L%,0;0;19,L%-2,4;0;
19,L%-1,1;0;
 1220ENDPROC
 1230DEFPROCscl
 1240L%=L%-1:IFL%<13L%=15
 1250PROClg:z%=-h%
```



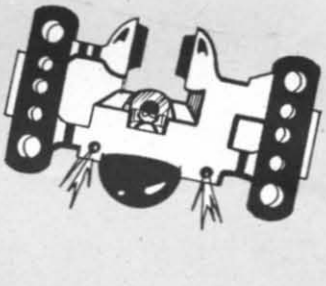
```
 1260IFL%=n%VDU19,L%,0;0;19,L%+1,4;0;
19,L%+2,1;0;:ENDPROC
 1270IFL%=o%VDU19,L%,0;0;19,L%+1,4;0;
19,L%-1,1;0;:ENDPROC
 1280IFL%=q%VDU19,L%,0;0;19,L%-2,4;0;
19,L%-1,1;0;
 1290ENDPROC
 1300DEFPROC2sp
 1310MOVEx%-w%,v%-y%:VDUt%:x%=x%+z%:t
%=t1%
 1320PROCfl:w%=RND(u%)*u%:y%=RND(u%)*
u%
 1330MOVEx%-w%,v%-y%:VDUt%
 1340z%=0:S%=x%-w%:S2%=0:T%=v%-y%:END
PROC
 1350DEFPROC2ch
 1360VDU23,249,195,129,189,36,36,189,
129,195:VDU23,240,0,1,3,7,7,7,15,15:V
DU23,241,224,248,248,248,252,252,254,
254,254:VDU23,242,15,15,31,31,31,31,1
5,15
 1370VDU23,243,254,255,255,255,255,25
5,255,254:VDU23,244,15,15,7,7,3,1,0,0
:VDU23,245,254,254,254,252,252,248,22
4,0:ENDPROC
 1380DEFPROCend:IFsum%<>5VDU4:COLOUR1
1:PRINTTAB(3,19)"MISSION FAILED":FORI
=1TO9000:NEXT:VDU19,0,0;0;:VDU5:CLG:E
NDPROC
 1390VDU19,0,0;0;19,4,4;0;:Y%=900
 1400VDU4:PRINTTAB(5,28)"            "
;TAB(3,29)"            "
 1410COLOUR12:PRINTTAB(2,0)"
      ";TAB(12,1);"      ";TAB(3,1)"
    "
 1420REPEAT
 1430*FX19
 1440VDU30,11:scr%=scr%+1
 1450VDU5:GCOL0,7:REPEAT:X%=RND(r%):Y
%=Y%+1:PLOT69,X%,Y%:UNTILY%=905:Y%=90
0:VDU4
 1460PRINTTAB(0,29)"
  ":VDU30
 1470UNTILscr%=50
```

→

Doomrun listing

From Page 145

```
1480scr%=0:Y%=60
1490REPEAT
1500*FX19
1510VDU31,0,31,10:scr%=scr%+1
1520VDU5:GCOL0,7:REPEAT:X%=RND(r%):Y%=Y%+1:PLOT69,X%,Y%:UNTILY%=65:Y%=60:VDU4
1530IFscr%=34:VDU5:X=630:GCOL3,4:MOVEX,96:VDU240,241:MOVEX,64:VDU242,243:MOVEX,32:VDU244,245:VDU4
1540UNTILscr%=50
1550col%=1:REPEAT:VDU19,4,col%;0;:col%=col%+1:FORI=1TO900:NEXT:UNTILcol%=15
1560VDU5:GCOL3,4:MOVEX,608:VDU240:VDU241:MOVEX,576:VDU242:VDU243:MOVEX,544:VDU244:VDU245
1570VDU23,242,32,4,76,81,206,32,102,6:xx%=242:tar%=0:S2%=0:S%=X:T%=576:PROCht:VDU4:COLOUR3:PRINTTAB(1,19)"MISSION SUCCESSFUL":FORI=1TO5000:NEXT:ENDPROC
1580DEFPROCsp
1590MOVES%+S2%,T%:VDUU
1600IFT%<i%T%=T1%:U=U%:S2%=S3%:S%=RND(j%)
1610IFT%=T1%ANDS%<S S1%=RND(Z%)
1620PROCf1
1630IFT%=T1%ANDS%>S S1%=-RND(Z%)
1640U=U+.5:T%=T%-f%:S2%=S2%+S1%
1650IFU>V U=V
1660MOVES%+S2%,T%:VDUU
1670IFU>61%PROCx
1680ENDPROC
1690DEFPROCx
1700X=RND(4):IFX<>3ENDPROC
1710D%=S%+S2%:E%=T%-d%:P%=P%-8:P1%=P1%-20
1720VDU19,0,3;0;:MOVED%,E%:VDUp%:SOUND1,1,22,4:PROCsi:X=0:MOVED%,E%:VDUp%:J=J-16:VDU19,0,0;0;:ENDPROC
1730DEFPROCse:GCOL0,7:MOVEJ,64:VDU250:GCOL3,7:ENDPROC
1740DEFPROC2she:GCOL0,12:MOVEJ,32:DRAWJ,64:GCOL3,7:ENDPROC
1750DEFPROC3sp
1760MOVES%+S2%,T%:VDUU
1770IFT%<i%T%=T1%:U=U%:S2%=S3%:S%=RND(j%)
1780IFT%=T1%ANDS%<S S1%=RND(Z%)
1790PROCf1
1800IFT%=T1%ANDS%>S S1%=-RND(Z%)
1810U=U+.5:T%=T%-f%:S2%=S2%+S1%
1820IFU>V U=V
1830MOVES%+S2%,T%:VDUU
1840IFU>61%PROCx
1850ENDPROC
1860DEFPROCpic:LOCALI%
1870VDU19,1,0;0;19,2,0;0;19,3,0;0;
1880VDU19,4,7;0;19,5,7;0;19,6,7;0;
1890X%=0:Y%=735:X1%=623:X2%=655:X3%=1279:Y1%=12:Y2%=12:F%=4:F2%=8:C%=1:M%=0
1900REPEAT
1910FORI%=1TOM%DIV7
1920GCOL0,C%
1930MOVEX%,Y%:DRAWX1%,Y%:DRAWX1%,Y%-Y1%:DRAWX2%,Y%-Y2%:DRAWX2%,Y%:DRAWX3%,Y%
1940Y%=Y%-F%:X1%=X1%-F2%:Y1%=Y1%+F%:X2%=X2%+F2%:Y2%=Y2%+F%
1950M%=M%+1:N%=N%+1:NEXT
1960C%=C%+1:IFC%>3C%=1
1970Z=Z+1
1980UNTILZ=28
1990ENDPROC
2000DEFPROCsh
2010GCOL0,9:MOVE0,36:MOVE426,36:PLOT85,426,68:MOVE0,68:PLOT85,0,36:GCOL0,10:MOVE426,36:MOVE852,36:PLOT85,852,68:MOVE426,68:PLOT85,426,36:GCOL0,11:MOVE852,36:MOVE1279,36:PLOT85,1279,68:MOVE852,68:PLOT85,852,36:J=1279:GCOL3,7:ENDPROC
2020DEFPROC2sh
2030GCOL0,11:MOVE0,36:MOVE1279,36:PLOT85,1279,64:MOVE0,64:PLOT85,0,36:ENDPROC
2040DEFPROCf1
2050*FX19
2060VDU19,C%,0;0;:IFC%=1VDU19,3,J%;0;ELSEVDU19,C%-1,J%;0;
2070C%=C%+1:IFC%>3C%=1
2080ENDPROC
2090DEFPROCdi:LOCALI%
2100DIMA(1,15)
2110FORI%=0TO14:A(0,I%)=RND(100)*10+100:NEXT
2120FORI%=0TO14:A(1,I%)=RND(100)+800:NEXT
2130ENDPROC
2140DEFPROCmo
2150B1%=A(0,A3%):C1%=A(1,A3%)
2160k%=RND(2):IFk%=1D1%=RND(4)*8ELSED1%=-(RND(4)*8)
2170REPEAT:PLOT69,B1%,C1%:B1%=B1%+D1%:C1%=C1%-2:PLOT69,B1%,C1%:UNTILB1%<0ORB1%>1279:A3%=A3%+1:IFk%=1x%=2280+RND(1000)ELSEx%=-1000-RND(1000):ENDPROC
2180DEFPROCsi
2190MOVEA%,A2%:VDU62:MOVEA1%,A2%:VDU60
```



```
2200A2%=A2%-f%-h%*(INKEY(-g%))
2210IFA2%<K%A2%=K%
2220IFA2%>K1%A2%=K1%
2230IFINKEY(-99)PROCfr
2240MOVEA%,A2%:VDU62:MOVEA1%,A2%:VDU60
2250ENDPROC
2260DEFPROCfr
2270IFX=3ORx%<0ORx%>r%ENDPROC
2280SOUND1,1,10,4
2290MOVEX%,Y1%:DRAWS%+S2%+Z%,A2%:DRAWXR%,Y1%:PROCf1:MOVEX%,Y1%:DRAWS%+S2%+Z%,A2%:DRAWXR%,Y1%:IFA2%=T%ORA2%=v%-y%sum%=sum%+1:PROCht
2300ENDPROC
2310DEFPROCht
2320l%=0:MOVES%+S2%,T%:VDUU:SOUND0,-15,95,15:m%=RND(6)*8
2330IFtar%=1S%=0:S2%=0:T%=-10:PROCf1:@%=1:ENDPROC
2340REPEAT:MOVES%+S2%+l%,T%-l%:VDUxx%:MOVES%+S2%-l%,T%-l%:VDUxx%:MOVES%+S2%,T%+(l%*3):VDUxx%:MOVES%+S2%-(l%*2)-12,T%+l%:VDUxx%:MOVES%+S2%+(l%*2)+12,T%+l%:VDUxx%:PROCf1:MOVES%+S2%+l%,T%-l%:VDUxx%:MOVES%+S2%-l%,T%-l%:VDUxx%
2350MOVES%+S2%,T%+(l%*3):VDUxx%:MOVES%+S2%-(l%*2)-12,T%+l%:VDUxx%:MOVES%+S2%+(l%*2)+12,T%+l%:VDUxx%:l%=l%+m%:UNTILl%>200
2360S%=0:S2%=0:T%=-10:PROCf1:H%=H%+A2%DIV6:GCOL3,7:VDU4:PRINTTAB(12,1);H%:VDU5:ENDPROC
2370DEFPROCst:LOCALS%,I%
2380S%=800
2390REPEAT:PROCf1:FORI%=1TOS%:NEXTI%:S%=S%-100:UNTILS%<0:ENDPROC
2400CLG:MODE7:REPORT:PRINT" at line ";ERL
>
```

This listing is included in this month's cassette tape offer. See order form on Page 177.

Now YOU can go for gold ...with the MICRO OLYMPICS

Fancy pitting yourself against the world's best at this summer's Olympics?

You can do so without going anywhere near Los Angeles – with the most challenging package of programs of 1984.

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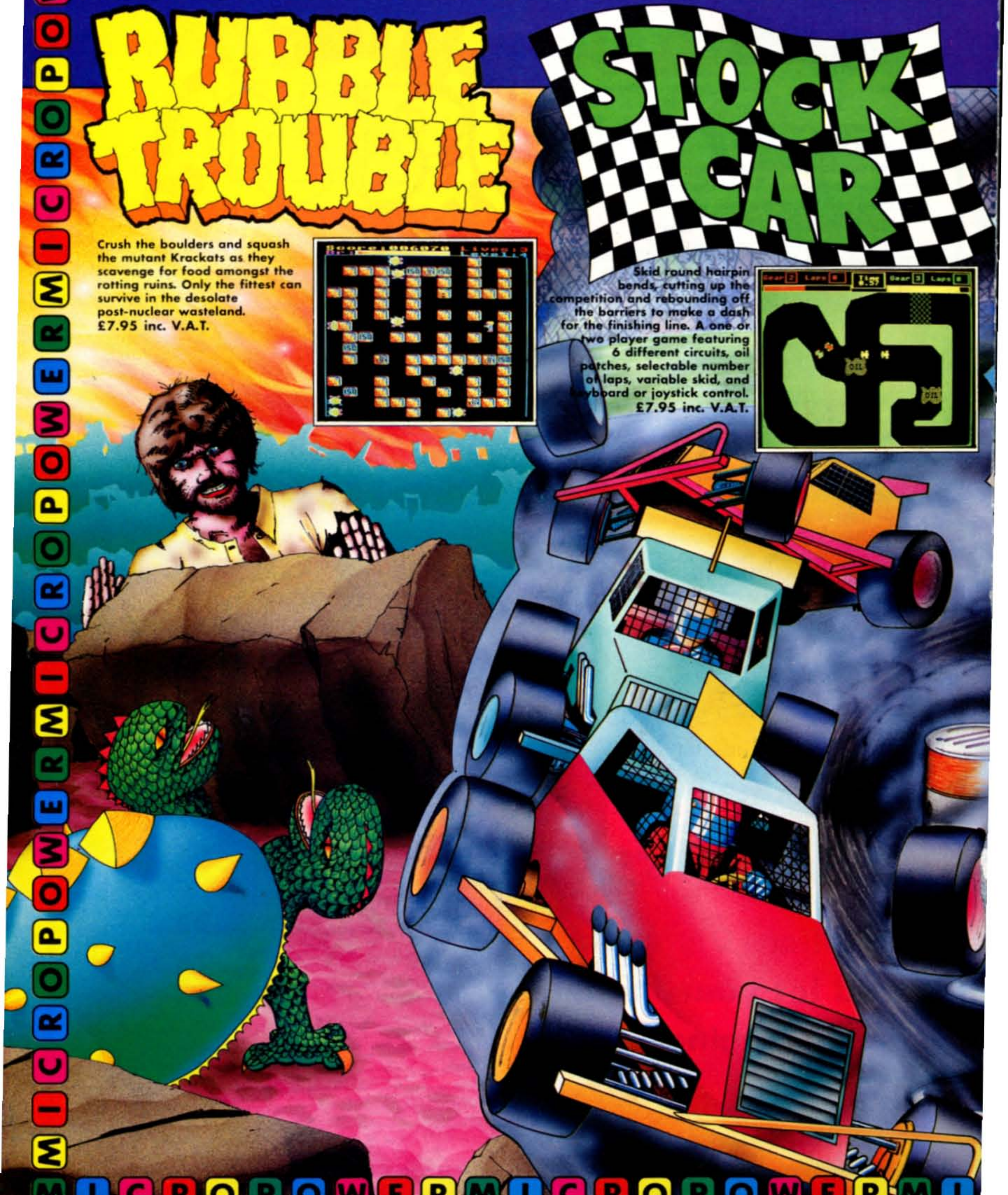
RUBBLE TROUBLE
Score:000070 Lives:3
Level:1
STOCK CAR
Gear 2 Laps 0
Time 0.57
Gear 3 Laps 0
OIL
OIL

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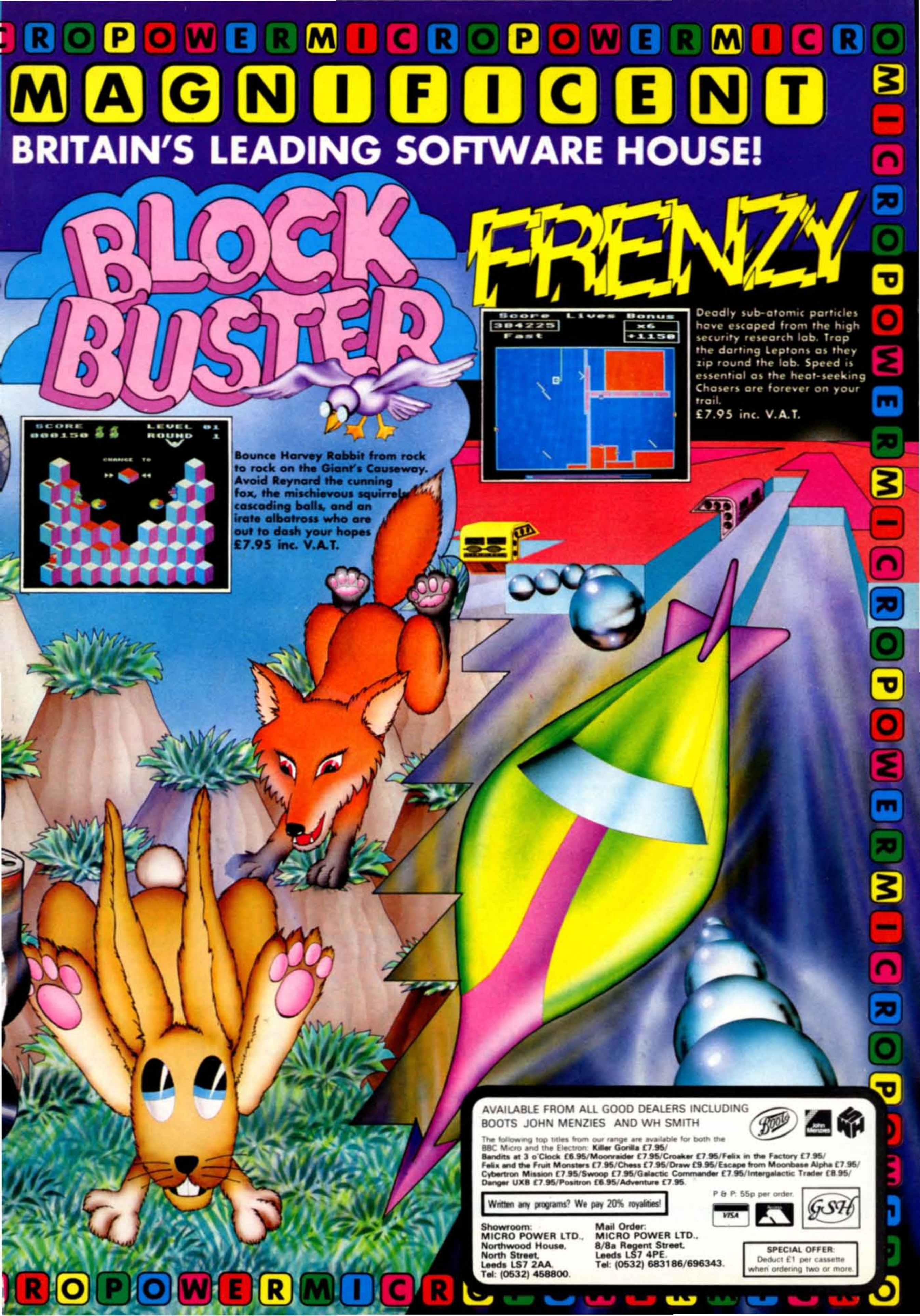

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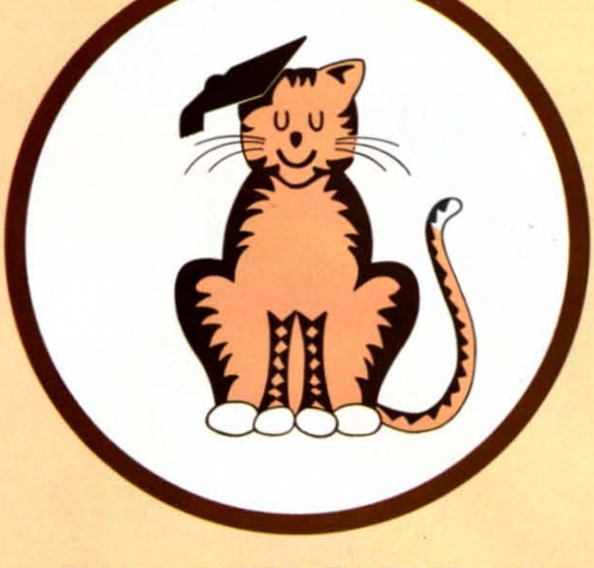

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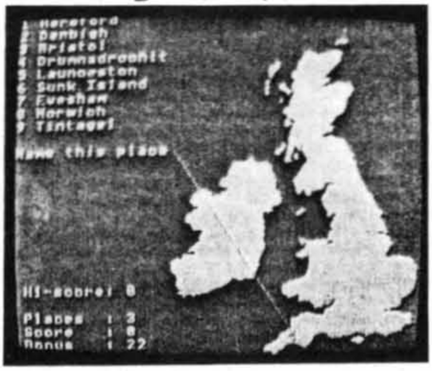

```
1 Hereford
2 Denbigh
3 Bristol
4 Drumnadrochit
5 Launceston
6 Sunk Island
7 Evesham
8 Norwich
9 Tintagel
Name this place

Hi-score: 8

Places  : 3
Score   : 8
Bonus   : 22
```

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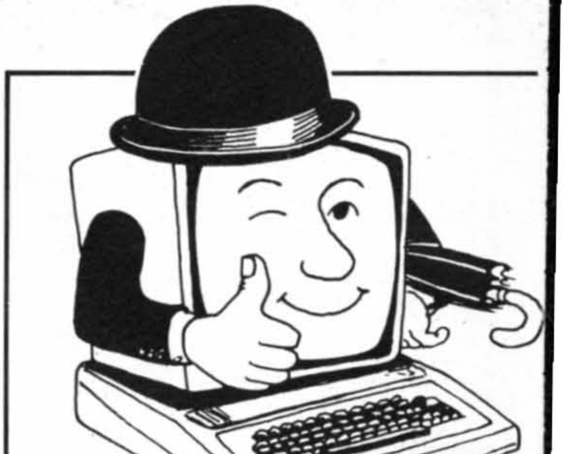

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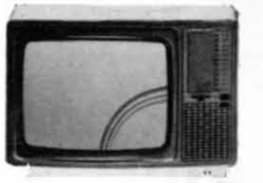

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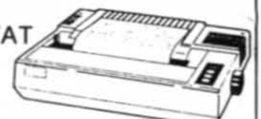

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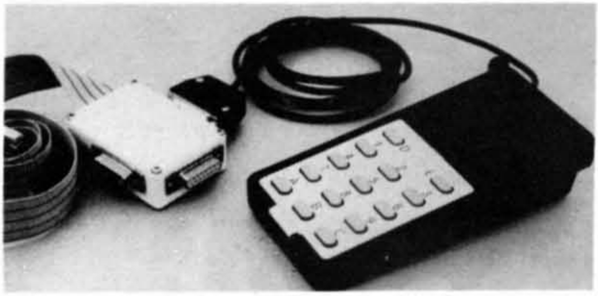

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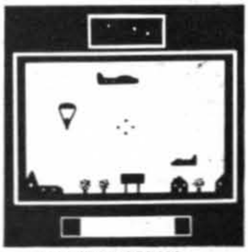

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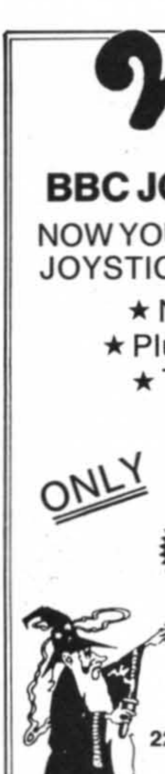

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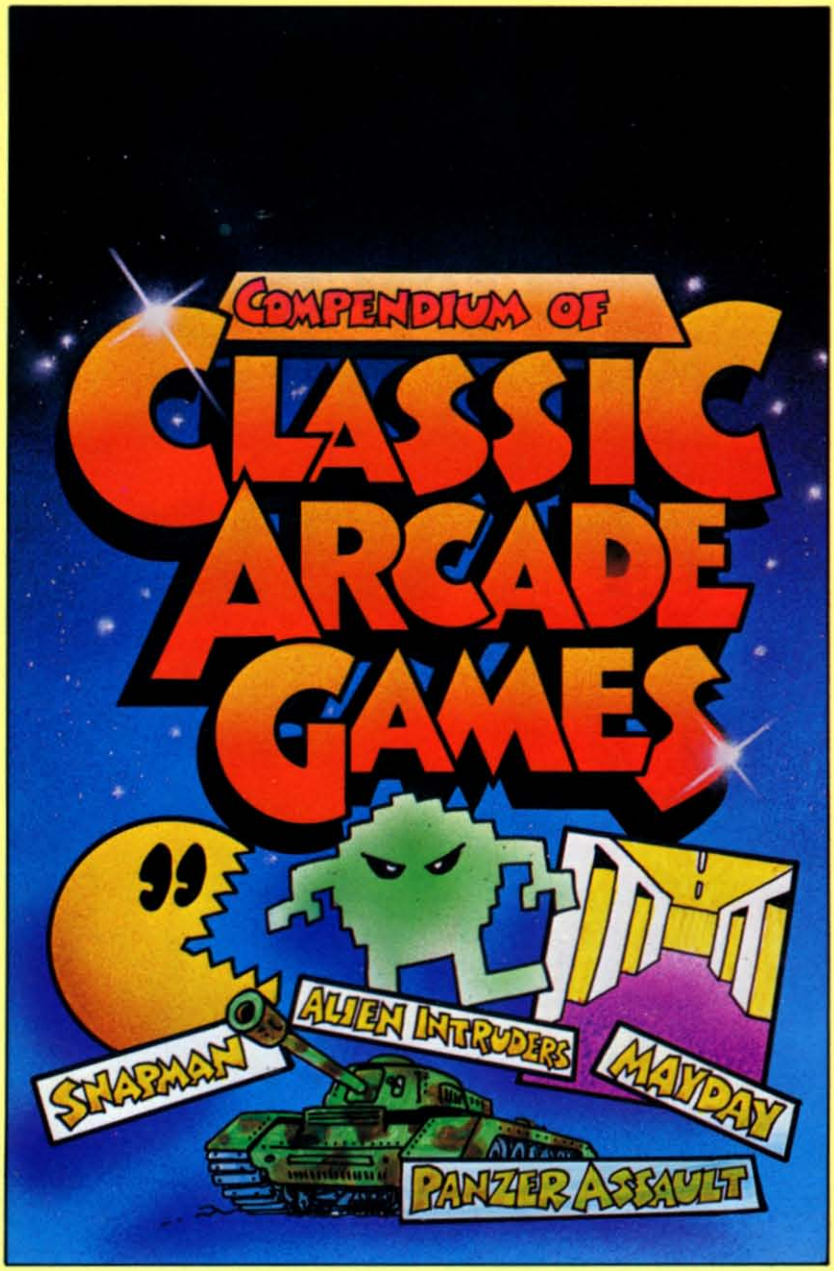

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MICROMAIL

Blackjack – never read such rubbish

I HAVE spent six years in the gaming industry, dealing Blackjack for most of that time, and I have never heard or read such rubbish in all that time regarding the placement of bets as appeared in the letter from Brian Spencer in the May issue of The Micro User.

The bet is placed before any card is dealt. The amount of the bet is either left to luck; calculated on what has occurred before, such as double-up of previous bet and win; a predetermined amount, such as the table minimum, or calculated on a card count system which is very difficult – I have only ever seen two competent card counters.

Of the methods described above the last one is the only method likely to show any profit over the long term.

It was the method used in the recent TV program about the use of a computer in a Las Vegas casino. In this case the computer did the counting and calculation.

All the above comments relate to Blackjack not Pontoon. There is, believe it or not Mr Spencer, a difference – a very important but subtle difference.

BLACKJACK: The player draws cards in such a manner so the dealer "busts", that is, has a card total of 22 or higher.

PONTOON: The player draws cards in order to beat the dealer, that is get closer to 21. – **A Lawrie, Leicester.**

Blackjack a winner

THANKS to Mr Spencer for his improvement to Blackjack (The Micro User, November, 1983). Although my family are not games addicts, this game was popular – but the improvement has added a new factor in selecting the bets.

Regarding the music, in the original version line 3170 ended as follows:

,4,145,4,137,4,129,16

I agree this sounds awful. After consulting my copy of the piano music I amended it to:

,4,141,4,137,4,129,16

This still leaves the tune – correctly – in a minor key. – **B.R. Kemp, Camberley, Surrey.**

Musical advice

FIRSTLY, many thanks for the best value for £1 publication anywhere around.

As a music teacher, I would like to advise Mr Spencer of Hertford that the blue note in the Fiddler on the Roof theme in Blackjack is in fact the third from the end, not the fifth.

The value 141 is quite correct and should be used for both the notes, three and five from the end.

As the tune is in the key of C, they are both technically B flats, not A sharps, and it is the B natural (145) which is causing musical distress at third from the end. – **Roger Darbishire, King's Lynn, Norfolk.**

Speeding up primes

MR C.H. Hayter's program for generating prime numbers in the May issue of The Micro User can be made much faster by making the following changes:

☐ *As all prime numbers beyond 2 are odd numbers, the possible primes can be generated by incrementing the starting value by 2 at a time instead of 1.*

☐ *Similarly, it is only necessary to try odd numbers as possible divisors so that these too can be generated by incrementing by 2 at a time instead of 1.*

☐ *It is only necessary to try possible divisors up to the square root of the possible prime number rather than to one half of it.*

☐ *The use of a REPEAT ... UNTIL loop in place of a FOR ... NEXT loop for seeking possible divisors. This enables looping to be stopped, in the case of a non-prime, as soon as the first divisor is found.*

I enclose a listing which incorporates the above changes. Incidentally, there is no need for anything elaborate to print the values in four columns, the semi-colon at the end of line 230 being all that is required:

```
100 REM Program name VPDPRIME
110 MODE 7
120 INPUT TAB(5,10)"Starting
      value",PN
130 INPUT TAB(5,12)"Finishing
      value",finish
140 CLS
150 TIME =0
160 PRINT '"List of Prime
      Numbers Between "';PN;
      " AND ";finish;'
170 REPEAT
180 X=3
    :isaprime=TRUE
190 REPEAT
200 IF PN/X=INT (PN/X)
    THEN isaprime=FALSE
210 X=X+2
220 UNTIL isaprime=FALSE
    OR X>SQR (PN)
230 IF isaprime
    THEN PRINT PN;
240 PN=PN+2
250 UNTIL PN=finish+2
260 PRINT '''"Time taken
      ";TIME /100;" seconds."
```

As an indication of the greater speed, the modified program lists to the screen the primes up to 499 in 19 seconds while Mr Hayter's program takes 398 seconds. – **Peter Davy, Wakefield, West Yorkshire.**

● Many thanks for the listing, it's always interesting to see how different programmers take different approaches. No doubt we'll have some even faster prime number programs sent in to us!

Two keys together

CAN you define the function keys as normal and then program them so that you can also press Control and a function key to produce something else? Also can you then press Shift Control and a function key to produce something completely different.

I would be very grateful if you printed this letter because I think other users would like to know if this is possible. If you can could you print the program to do this?

Also I think Mike Bibby's introduction to programming is very good and has some good example programs.

Let's have even more hardware reviews. Please could you extend the Micromail because I really look forward to reading it every month because of its tips and stories of things other people have problems with.

Keep up the good work. – **Sean King, Dalton, Huddersfield.**

● Usually the function keys can be programmed to produce

▶

From Page 161

strings of characters, but it is also possible to enable these keys to produce single Ascii codes.

This is done using *FX255,X where X is used to set the base value. Executing *FX255,65 would cause f0 to return the Ascii value 65 (the letter A), f1 to return 66 and so on.

*FX226 sets the base value for Shift+function key codes.

*FX227.228 set Ctrl+function key and shift+Ctrl+function key codes respectively.

You can then intercept these Ascii values with your program and execute any code that you wish to have associated with the keys pressed.

Setting up function key

CAN anyone suggest a way of setting up and using a BBC function key without having its entire contents displayed during execution?

I want to use a function key to show the catalogue of a disc, and to reveal at the same time whether the disc in question is formatted as 40 tracks or 80 tracks.

I have set up the function key as follows:

```
   10 *KEY4 *CAT|M IF ?&F07
=&20 THEN P."(0 TRK" ELSE P
."40 TRK"|M
```

but I don't want to see all this detail on the screen, I just want the message.

Have you any clever technical suggestions? – **Colin M. Johnson, Hythe, Kent.**

```
   10*KEY4 *.|M VDU21|H|H|H
|H|H     |M IF?&F07=&20 THE
N P."80 TRK" ELSE P."40 TRK
"|F|M
```

● The single line program shown here should set your key up for the desired effect. Note carefully that five spaces follow the final H.

The routine works by turning off the VDU drivers with VDU21, then backing spacing five and "printing" – though not with the print command – five spaces over VDU21.

Thus the command disappears and no further output is enabled until it meets Ctrl F.

Selecting menus

I WAS very interested in the article by Ian Murray in which he suggested ways of preventing pupils from looking at the program, and so interfering with it.

In his example, he uses the first five letters of the alphabet and then changes to use the first five numbers. A better way might be to use letters which have some connection with the choice to the made.

For the options given we could have had:

PROGRAM OPTIONS

A) Amend a file
C) Create a file
D) Delete a file
F) Find a record
S) Sort a file

Press the key shown against your choice>>

We can then have a program fragment as follows:

```
210 valid$ = "ACDFSacdfs"
220 REPEAT
230 reply$=GET$
240 reply = INSTR(
valid$,reply$)
250 UNTIL reply>0
260 IF reply>5 THEN
reply=reply-5
```

This could be developed into a function for use with any menu in the program.

In this case the 5s in line 260 would need to be replaced with a parameter to be passed to the function along with the valid string.

Provision could be made for future additions to the menu by including dummy characters in the string and then detecting them before returning a value to the main program.

The structured programming controversy will, presumably, run for ever – but it is interesting to see that many of the critics do not really understand what it is they are criticising.

Dr Freshwater seems to think that advocates of structured programming, such as myself, are unaware that "IF<condition> THEN <linenumber>" is a disguised GOTO.

Of course it is, and it is just as bad there as anywhere else. There is no problem with a structure such as:

```
200 IF a>0 THEN PRINT a
ELSE PRINT -a
```

or:

```
500 IF a>0 THEN PROCblack
ELSE PROCred
```

and, in a language without procedures, there must be room for:

```
800 IF a>0 THEN GOSUB 5000
ELSE GOSUB 6000
```

even though this is not as clear.

The objection is to the complete transfer of control implied in GOTO.

Mr Hughes says that all the structures are just fancy forms of GOTO and GOSUB. In this he is absolutely right, but the fanciness makes the structure easier to understand and amend when necessary.

He forgets that Basic itself is a fancy form of machine code, but much easier to read. – **David H. Wild, Hemel Hempstead, Herts.**

Finding the 'BRK' bug

AFTER spending two hours typing in the machine code monitor in the June issue of The Micro User, I found that each

Acorn 'wisdom'

HAVING endured the frustrations of the 0.1 operating system with over 30 of the FX and OSBYTE calls being "only available from issue 1.0", I was pleased to be able to install my new 1.2 OS in the assurance that all would now be well.

But no! Acorn in their wisdom have done some rearranging of addresses.

As part of a drawing program I have written it was necessary to locate the position of the graphics cursor. Jeremy Rushton's "BBC Revealed" gives the four last locations where the X and Y co-ordinates of the graphics cursor are stored in memory:

	LSB	*MSB*
X	*&033C*	*&033D*
Y	*&033E*	*&033F*

Unfortunately this is not true with the 1.2 OS.

After a little experimentation – and further frustration– I devised the following short program which, although written for this specific problem, can easily be adapted for testing for other locations:

```
  10 MODE4
  20 X=400:Y=300
  30 MOVE X,Y
  40 FOR M=&0000 TO &30FE
  50 L=?M:H=?(M+1)
  60 V=L+(H*256)
  70 IF V = X THEN PRINT"X
AT LOCATION "~M,~M+1
  80 IF V = Y THEN PRINT"Y
AT LOCATION "~M,~M+1
  90 NEXTM
 100 PRINT"END"
 110 END
```

Running the program we discover that the location of the graphics cursor is now stored in the following locations:

	LSB	*MSB*
X	*&0310*	*&0311*
Y	*&0312*	*&0313*

I would be interested to learn of any other similar alterations of address which your readers have discovered. – **John G. Swift, Stockton-on-Tees.**

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

time a "BRK" instruction was executed, the program returned back to Basic command mode.

I knew that this couldn't be right, so I set about finding the bug.

The problem is that the program makes two calls to the Basic ROM, both in line 60 of Listing I. These two calls only work on a 1981 Basic machine.

My trouble was that I had a Basic II machine. These are the equivalent calls which owners of the 1982 Basic need to change in the program:

Change JSR&BD52 to JSR&BD3A and JSR&8AE1 to JSR&8B38.

By the way, the monitor is as good as any other on the market. – **Peter Stanesby, Stockport, Cheshire.**

● Quite right, thanks for spotting and solving it! Our shame-faced assessor claims that they'd wrongly re-labelled his machines at work.

In search of a dump . . .

A FEW months ago, I bought a Tandy CGP-115 plotter/printer and have been very pleased with it.

I now want a screen dump for my printer but I cannot seem to find one.

Do you know where I could obtain a screen dump program for a Tandy CGP-115 connected to a BBC Micro Model B (OS 1.2)? – **A Brown, Doncaster, South Yorkshire.**

● I'm afraid none of us here has a dump – can any reader help?

Machine code poser

YOUR enthusiastic response to the letter by D. Marchington in the May issue of The Micro User concerning a puzzle feature has prompted this suggestion.

If a machine code program is situated at &C00 onwards, it can be printed as a series of user defined characters starting with character number 128 (&C00 – &C07) just as if the code had been hand assembled and entered as a VDU23,128, etc statement.

The object of the puzzle, therefore, is to come up with a useful piece of machine code which also forms part of a user-defined picture, such as an alien in a game, or a letter of a different font.

Ideally the two requirements should complement each other, and as far as the code is concerned there should be no excessive dependence on "silly" op codes like NOP, CLD, INX, then DEX, etc, simply to make the picture work.

Some of this has to be tolerated since the opcodes were not conceived with this in mind.

I've called all the ones I've made so far Explosions since that's all they look like, even with the lights out. It also explains the large number (&FF+1) of examples I've enclosed – it's not as simple as it appears.

I hope this is of some use. – **James M. Methven, Morton, Wirral.**

● What a nice idea – and what a brain-teaser. Can any of our readers come up with any ingenious machine code masterpieces?

Thinking comes to the rescue

I READ your article on rescuing a program in the March 1984 issue with some sadness. The loading of Mazemunch failed already in the first block.

But I started thinking and see what I found.

I retyped the first nine lines of the program – about 300 characters – and saved these lines on a new tape. Next I turned the old tape just between block 00 and block 01.

I then loaded the new tape until the beep between the two blocks and pressed the pause key of the recorder.

Then I changed the tapes and continued the loading. The computer didn't notice the changing but printed afterwards the message "Bad program".

No panic. I expected this because I knew that I had typed in some more spaces, so I typed:

```
*KEY0 FOR I=I TO I+20:
PRINT I,?I: NEXT|M
```

I=PAGE and then repeatedly F0. So I checked the series of 20 lines on 13s and line lengths and found the last 13 before 3840 (end of block 00) appeared on 3829. On 3832 I read 69. The next 13 was to be seen on 3903 and not on 3898.

So I typed ?3832=74 and . . . hurrah. It worked again.

Now I deleted the five double characters and saved the program on two tapes.

With a combination of mine and your solution it's possible to rescue each program by retyping just one block – but I won't need it anymore. – **L.J.T. De Vreede, Grave, Netherlands.**

Solution to strings

FURTHER to the article by David Lewis on Page 141 of the April issue of The Micro User I should like to submit a better solution for sorting strings of different lengths without having to pre-allocate each one to the maximum length.

The article mentioned the 4 byte string information block which is created for string variables by the system, giving the impression that these formed an undesirable overhead.

This is not so.

Each string information block gives the address, current and maximum length of a string of data.

For string arrays, the string info blocks for each element are contiguous in storage. Instead of sorting the strings, it is far more efficient to sort the 4 byte pointer values.

For example:

```
10 X%=100  *SIZE OF ARRAY
20 DIM A$(X%)  *CREATE
ARRAY
30.... some code to place
40.... data in array A$

100 P%=&70
110 [RTS]
120 CALL &70, A$(0)  *CALL
ROUTINE
130 firstptr%= !&601 AND
&0000FFFF  *EXTRACT
LOCATION OF INFO BLOCK
140 lastptr%= firstptr%+
X%*4  *FROM PARAMETER BLOCK
AT &600
```

To understand how the CALL statement works, see pages 214/215 in the User Guide.

At any time, the 4 byte string info block for element A$(N) can be calculated by:

currentptr%=firstptr%+N*4

Alternatively, the code shown in lines 120 and 130 can be used by specifying A$(N) as the parameter on the CALL statement.

The string sort would thus become:

```
200 FOR I%= 0 TO X%
210 FOR J%= I% TO X%-1
220 s%=firstptr% + J%*4
230 e%=s%+4
240 IF A$(J%) >A$(J%+1)
t%=s%!0: s%!0=e%!0:e%!0=t%
250 NEXT
260 NEXT
```

This sort will not actually move any strings around in

➡

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storage. It merely shuffles the string information blocks into the correct order.

As each swap requires only 4 bytes to be moved, it follows that this method is much faster, as well as not producing garbage areas in the micro's memory. – **Stefan Neumann, Yatton, Bristol.**

Window problems

I WONDER whether anyone has experienced the same problems as myself while using the graphics window facility (VDU 24) on the BBC Micro.

In one particular program I repeatedly define a window using VDU24, execute some graphics which require the window to prevent the remainder of the screen being corrupted, then restore the default windows using VDU26 and update the graphics on the remainder of the screen.

As such this procedure works well. However if, while operating in the default window, the origin is redefined using VDU29, the subsequent VDU24 command is ignored and graphics continue to use the whole screen.

I have solved my immediate problem by completely avoiding the VDU24 command. Memory locations &300 to &30B contain the internal coordinates of the current graphics window and it is the contents of these locations which are changed using VDU24 or VDU26.

Of course it is possible to write to these locations directly and this is what my program now does without any possibility of interference from the VDU29 command.

It must be emphasised that internal coordinates are not the same as the external ones normally used with VDU24 but they can be found by executing VDU24 with the relevant coordinates in the immediate command mode, then examining the contents of &300 to &30B with the ! indirection operator.

Unfortunately this cannot be viewed as a total solution to the problem because the way the operating system uses memory could be changed, but it does extricate my program from the need to be very much rewritten. – **S.J. Stewart, UMIST, Manchester.**

● The reason that a window is not set up is that there is probably a parameter out of range in your VDU24 statement.

Graphics windows are defined relative to the origin, not relative to the bottom left corner of the screen. Your program can probably be corrected by subtracting the position of the origin from the VDU24 parameters, or by putting VDU24,0;0; before each VDU24.

The following simple program illustrates this:

```
   10 MODE1
   20 VDU24, 100; 100; 500;
500;
   30 GCOL0,130
   40 CLG
   50 VDU29,200;200;
   60 MOVE0,0
   70 DRAW100,100
   80 VDU26
   90 VDU29,500;500;
  100 MOVE0,0
  110 DRAW500,200
  120 VDU24 ,600; 600; 900;
900;
  130 CLG
```

As it stands, the whole screen is cleared by the final CLS. To correct it either insert line 115 as:

```
  115 VDU29,9;0;
```

or change line 120 to:

```
120 VDU24,100;100;400;400;
```

Downloader spotted

I HAVE spotted a mistake in your downloader listing in the May Micro User . . . the first mention of E00 has a "%" in front of it. This should be a "&".

I work in the printing industry and fully appreciate how little errors like this can slip through the best of double checks.

I hope you don't mind me pointing this out as it will cause problems to people who are new to programming. – **Hugh Mitchell.**

● Well spotted. The correct version is shown here.

```
    1 *KEY0 *TAPE|M N%=PAGE
-&E00: FOR L%=PAGE TO TOP S
TEP 4:!(L%-N%)=!L%:NEXT:PAG
E=&E00|M OLD |M
```

Alternative to *SAVE

I WISH to tell you first how much I enjoy your magazine. I have found it is the best one out for the BBC Micro.

I have a few problems that I hope you or one of your other readers could help me with.

*How can I read a graphics screen as a data file rather than having to *SAVE the screen memory? I have been told this can be done with OSWORD, but I do not know how this is used.*

What is the difference between Basic I and Basic II? I have been told I have Basic II, but what extra commands do I have from the User Guide? – **David Chance, Evington, Leicester.**

● It is possible to save a graphics screen without using *SAVE by writing each byte of screen memory to an open file with BPUT .

For example you can save a Mode 2 screen as follows:

```
10 U%=OPENOUT "SCREEN"
20 FOR C%=&3000 TO &8000
30 BPUT#U%, ?C%
40 NEXT C%
50 CLOSE#U%
```

The main differences between Basic I and II are the extra assembler commands of the latter, the addition of the OSCLI command – which allows strings to be built up and then passed to the command line interpreter – and an additional command for handling files.

There are also various other minor changes, such as the log function being more accurate.

Show for Scotland?

MAY I first congratulate you all on a first class magazine, which I consider to be much better than the rival magazine which Barry Wood so aptly described as "the magazine for squirrels"!

But now to my question. Can Scotland expect to see The Micro User Show? So far it has only been held in England.

Glasgow and Edinburgh are both perfectly able to host a show of this nature. I am sure that I speak for many Scotsmen who own a BBC or an Electron. – **Sandy A. Rough, Fife, Scotland.**

● Unfortunately, we have as yet received very little demand for a Scottish show, from either the public or exhibitors. However, if there is a need we would like to hear of it.

The nearest show to you will be the Manchester show at UMIST, from August 31 to September 2, 1984.

From tape to memory

I FIND The Micro User extremely helpful to a comparative beginner to computing, like myself. It is a good reference to the "how to" part of computing. Please keep up the excellent work.

Is there any way in which proved sections of programs that have been saved on tape can be concatenated into memory? – **Royston March, Newcastle, Staffs.**

● Programs can be merged by use of the *SPOOL command.

At first the process may seem a little complex, but it soon becomes second nature.

The first point to remember is that the programs you are joining must have distinct line numbers. This is easily done with RENUMBER.

Normally the line numbers

are totally separated, one program's numbers being lower than another.

However, in actual practice they can be interleaved – one program going up in fives and the other in tens, so that no lines in either program have the same line number. You'll see why later.

Now take one of the programs and load it into memory. You are going to have to save it in a special way, so pick a filename. Here I've chosen PROG1.

Then type:

```
*SPOOL PROG1
LIST
*SPOOL
```

The program will be saved in a special form as PROG1. This is known as a spooled file – you won't be able to CHAIN or LOAD it.

If you're on tape, you'll get prompts for Record and Return, and so on.

Once it's safely saved, load the second program into memory and then enter:

```
*EXEC PROG1
```

and obey any prompts. On tape you'll have had to rewind.

Each line of the program will then be loaded as if it had been typed in from the keyboard, followed by a Return. This means that each line will be added to the program already in memory just as if we were typing it in ourselves. That is, the two programs merge.

Notice also that if two line numbers were the same, the one already in memory would be replaced by the one spooled in, just as typing in a new version of a line replaces the old one.

Finally, you'll get a syntax error message when spooling. Ignore it. Just LIST when it's all over and you'll see the two programs are merged properly.

Shorter suppression

FURTHER to my letter concerning suppression of screen display, which you so kindly published in your December issue, and a reply in the February issue, I now enclose a shorter and more useful version of the Basic procedures.

```
10 DEFPROCpron :xp=POS
:yp=VPOS: VDU28, xp, yp,
xp, yp, 2: ENDPROC
20 DEFPROCproff :VDU3, 26,
31, xp, yp: ENDPROC
```

In this case, the cursor is left flashing, but the zero text window is set at the current cursor position, and on resetting the text window, the cursor is returned to the current position.

Consequently there is no disturbance to the screen display. Obviously a "Printing", or any other message can be displayed before zeroing the text window if required.

I also have a query which perhaps you can answer?

I have one of the early Model Bs with the old type power supply. This does not have an external socket for disc drives, etc.

Does this power supply have sufficient capacity to power a disc drive or The Hobbit, and if so, is it possible to fit a socket for this purpose? – **Peter Vasey, South Shields, Tyne and Wear.**

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the early type power supplies for disc drives. When you get official Acorn upgrades, they swap the power unit for you.

Our own preference – and it's sheer prejudice – is for drives with their own power supply in.

Saved by WIDTH

ON the BBC Micro O.S. 1.2, location &30A contains the last character position allowed on a line, for example 39 in Mode 7. If this is increased by one it prevents a character in the last position on the screen causing a line feed.

Unfortunately characters may be lost off the right hand edge of the screen if you try printing there, but this can be prevented by use of the WIDTH command. The instruction to use is:

```
X%=?&30A+1:?&30A=X%:WIDTHX%
```

On 0.1 O.S. use &329 in place of &30A. – **Arnold Davison, Buxton, Derbyshire.**

What do you want?

AS a part of my A level design course, I am designing a computer desk and work unit for the home user.

At the moment I am investigating what form one of these units should adopt, whether it be an expandable system or a solid single unit.

With the consumer in mind, I am writing to ask your readers what they would want from a computer desk.

As I will be designing, making and possibly selling the design of this desk, I would be very grateful for any ideas received from your readers. – **S. Plenderleith, Kirkbie Kendal School, Lound Road, Kendal LA9 7EQ.**

Secret of eternal life

YOU will have seen the article on how to cheat Acornsoft games in the September issue of The Micro User.

Well I have discovered, with the help of a friend, that it is possible to have an infinite (unproved) number of lives on Acornsoft's Rocket Raid. This is how you do it:

```
LOAD"RAID"
PAGE=&4000
LOAD"RAID2"
1850 ?&117B=&74
RUN
LOAD"RAIDOBJ"
```

Please print this letter so the readers can have a greater chance of penetrating Rocket Raid's defences. – **Duncan Slade, Chandlers Ford, Hants.**

Slowing the ball

IN Microgolf (Micro User, April 1984), the ball is insufficiently retarded by the rough. Might I suggest the following amendments:

```
215 P1%=PO%
300 IF P1%=0 THEN C=C/2
```

– **Simon Hughes, Kingston.**

And finally, with tongue firmly in cheek . . .

How the experts really do it

Dear Trev,

It goes from bad to worse. Do you ever remember playing a game called "Sardines" in the dim and distant past? Well it came to mind when Andrea and I visited the last Micro User Show. A. had come along to keep me company, hold my credit card and make snide remarks.

"Well, I won't have to have a sauna tonight", she observed by way of practice as we struggled in. I responded with a weak: "It shows how popular the Beeb is".

That didn't stop her. "Oh, they're not all spotty schoolboys", she added in a loud voice as she passed a spotty schoolboy who was busy ripping off sideways ROMs.

The next half hour was a misery of "whispered" asides and stupid questions. I finally slipped away from her as she was asking one manufacturer which aeroplane his joystick came from. I found the first bit of space I could and sat down, leaning against the wall.

As I looked round keeping watch for A, I realised that I was by the side of the technical advice stand and could actually see the "experts" at work.

I became intrigued by the fact that under the counter they had a lot of leaflets. Every now and then someone in the know would ask the "experts" something. They'd scowl, reach down and give them a set of printed sheets. Intrigued, I approached the side of the stand hoping to grab a leaflet or two. This was my big mistake.

As I attempted to purloin a couple of sheets while the experts were doling out advice, one of the crush of would-be questioners interrupted me.

"Excuse me, could you tell me where the toilets are?"

Relieved that I actually knew the answer to one question, I told him. Before I could get back to my thieving another seeker of technical advice grabbed me.

"I've got a question", he panted.

"Ah, no". I wheedled, looking round anxiously to see if the experts had rumbled me, "it's not me you want".

"Oh yes it is", the little dear continued, "my dad took me to see you at the Romchester Rogues. He hasn't stopped laughing. Now this is my problem . . ."

And that was it. I was stuck behind the advice stand and I couldn't get away. Every time I fobbed someone off with an "answer" another one took his place.

It's not even as though the experts seemed to mind or notice. Probably they were glad to have a helping hand. Certainly they seemed to accept me, sending people with questions they couldn't handle down to me with a cheerful, "Ask Wally".

I even picked up some of their techniques. I soon learnt to play for time by stroking my beard and saying, "Technically we're supposed to give advice". And then there was the trick of sending them to the other end of the counter to ask "our disc/printer/machine code" expert.

Still there were some close shaves. I spent half an hour trying to debug one program for a nephew Nigel lookalike before I realised that it was for the Plectrum not the Beeb.

And it took me ages before I could deny that there was ever anything wrong with "our" programs without smiling.

I knew that the lads had accepted me when they sent me for coffee. It was great being there on the stand with the people who write the articles that I always leave "for later, when I've more time".

They even lent me a copy of the Remedial Users Guide with the advice that if it got too hot, "just give 'em that to read, it soon shuts them up".

All good things come to an end, and this little episode finished with my looking up and seeing Andrea.

"I want some advice. I've got a husband who spends all his time on his micro and ignores me? What can I do?"

"Buy him a second processor to show him you care", I replied savagely.

With that A. thanked all the "experts" for taking care of me, saying that I'd wandered away and got lost.

Sheepishly I left. Will I ever be able to read an article by Notman or Cook without blushing? I doubt it.

Yours, crimsonly,

Bob

P.S. I never did find out what they had under the counter!

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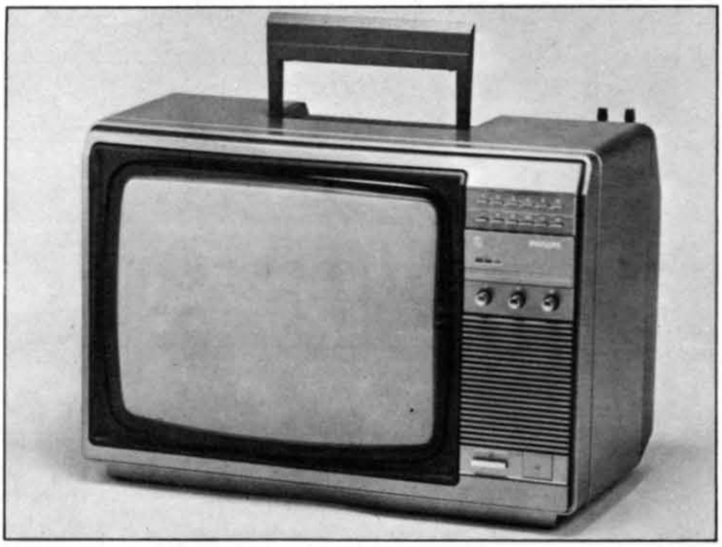

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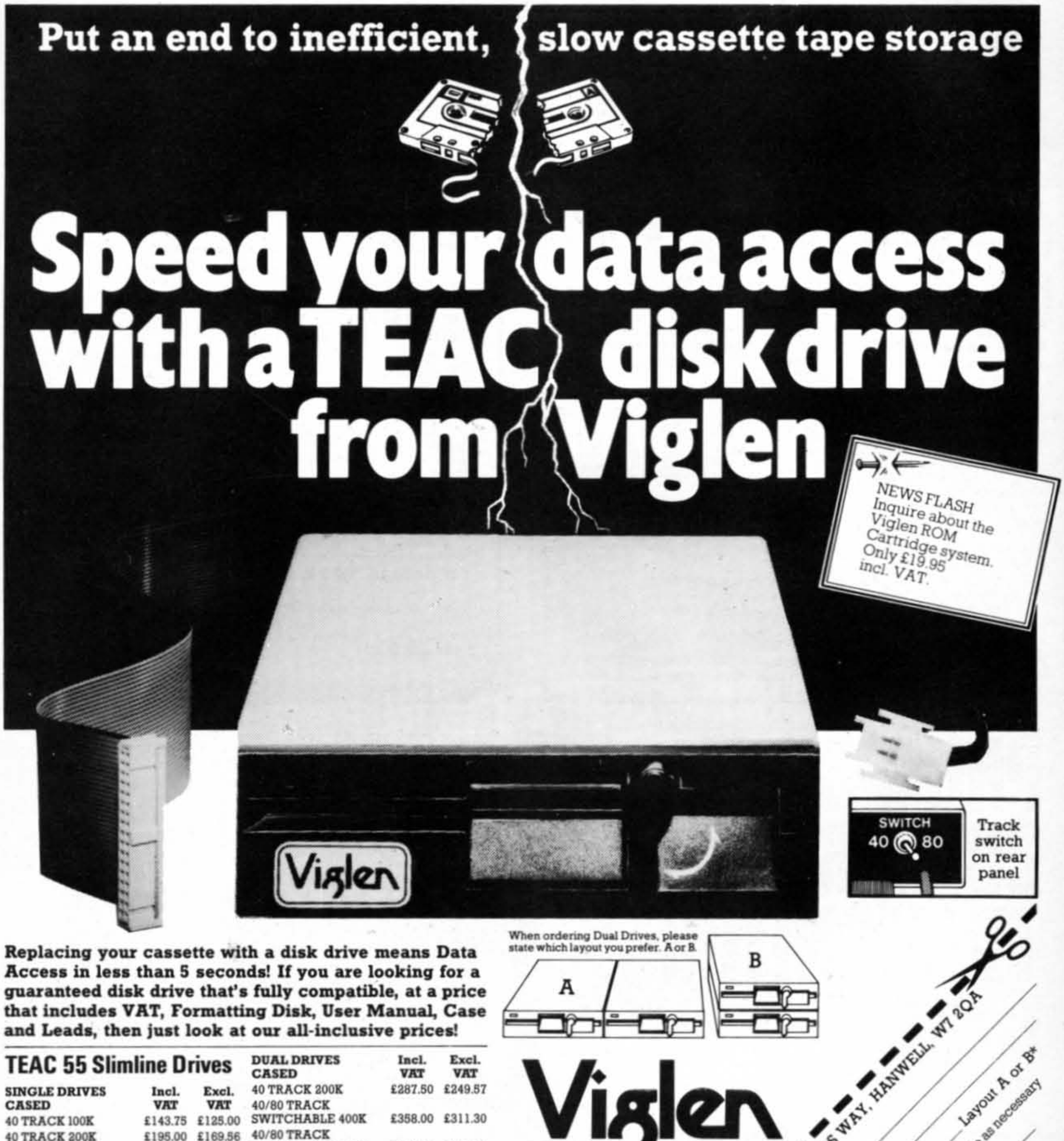
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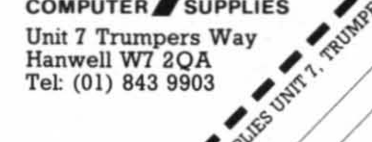

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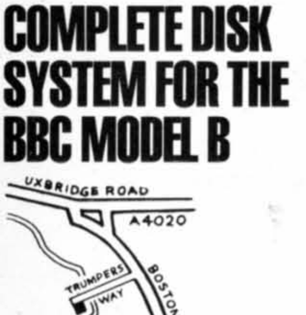

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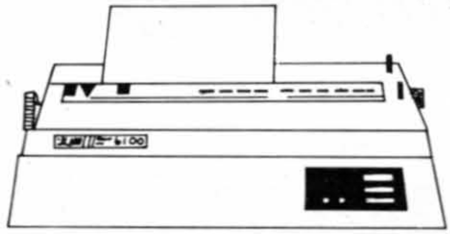

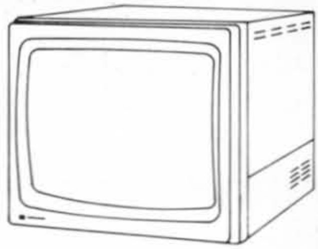

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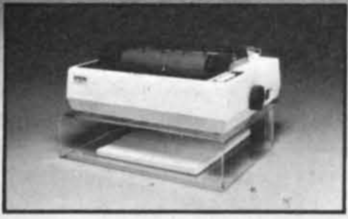

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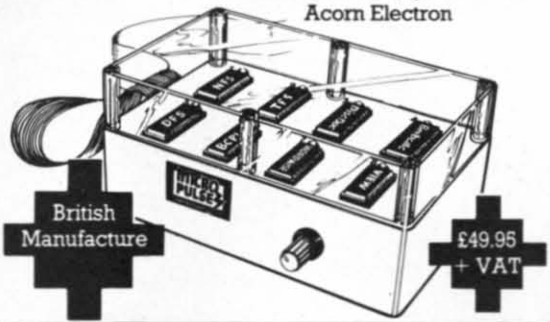

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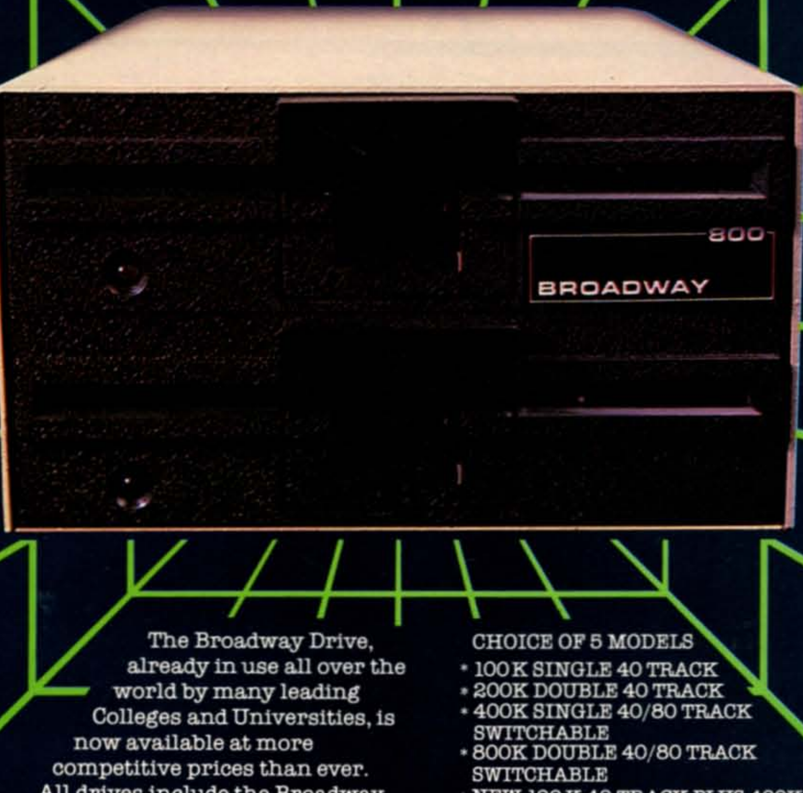

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JULY: Tenpin, a simulation of Tenpin Bowling; **Spacepods,** beat the alien hordes; **Cup,** exciting 3D graphics techniques **Test** and **Steady,** programs to accompany the Beeb Body Building Course. **Breakfix,** don't let Break destroy your precious variables!

AUGUST: Fruities, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **Animation,** a suite of programs that really bring your screen alive; **Casdisc,** the machine code downloader for your disc system; **Mode** 7 colour routines.

SEPTEMBER: Robin & Marian, rescue Maid Marian from the Sheriff of Nottingham. **Galactic Invaders,** an exciting arcade game. **DFS Benchmarks,** 14 DFS test programs. **Animation,** new techniques. **Terminal,** connect a BBC Micro to a mainframe.

OCTOBER: Fishing, a compulsive day's angling. **Joykey,** convert programs to joystick. **Pentest** and **Bellringer,** for Micro User lightpens. **Contours,** an educational program. **Link** BBC Micros to each other. **Plus** all the listings from the first Electron User.

NOVEMBER: Goblins, an enchanted journey. **Blackjack,** the casino favourite. **Charge** and **Pendulum,** Body Building Course part 9. **Sideways,** programs in ROMs. **Pendraw,** a light pen sketching program. **Plus** all the programs from the second Electron User.

DECEMBER: Tower, rescue London's treasure. **Santa,** help Father Christmas deliver his presents. **VDU 23,** an invaluable character defining utility. **Paged,** the listing from our paged graphics article. **Plus** all the listings from the third issue of Electron User.

JANUARY 1984: Barrels, an all-action arcade game. **Noteplay,** an entertaining musical utility. **Dump1** and **Dump2,** multitone screen dumps. All the programs from our **Sound, Beginners'** and **Graphics** articles **Plus** 12 programs from the fourth Electron User.

FEBRUARY: Invasion, the classic arcade game. **Frogs,** fun for all the family. **Engvgen,** a logic game. **Balance,** a number learning program. **Key,** single key entry for the BBC Micro **Plus** nine other programs from *The Micro User*.

MARCH: Mazemunch, blockbusting arcade action. **Birthday,** family fun for our anniversary. **Derrick,** number fun for infants. **Pixelpen,** high resolution for lightpens. **Loadtape,** a recovery utility. **Plus** 18 other programs from the pages of *The Micro User*.

APRIL: Microgolf, the simulation. **Eastermaze** and **April Fool,** seasonal games. **Seawall** and **Magic Square,** maths fun. **Filer** and **Album,** a database of sounds. **TRX1, TRX2,** RS243 driver. **Heartrate,** monitor your fitness.

MAY: Dug Dig, asteroid adventures. **Damraider,** naval action. **Envaid,** easy envelopes. **Steppers,** Body Building motor control. **Spiro,** graphics windows. **Adventure,** a trapdoor maze. **Renumber,** program utility. **Bigletter,** large type. **Memory,** RAM efficiency.

JUNE: Roadracer, 3D driving action. **Quadline,** four-in-a-line logic game. **Monitorone, Monitortwo,** machine code debugging routine. **Toolkitone, Toolkittwo,** 8271 disc controller explored. **Areas,** easy maths. **Spell,** spelling education. **Spokes,** simple, beautiful graphics.

JULY: Doomrun, deep space drama. **Backgammon,** the classic board game. **Keys,** user defined key editor. **Save?** and **Tidisk,** disc utilities. **Alice1** and **Alice2,** mini-adventures. **Terminal1** and **Terminal2,** two communication programs. **Acoustic,** software for the Body Build Modem.

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